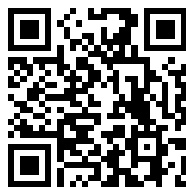

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Twin Cities Campus



CHINA SEA PILOT,
VOL. I.
FIRST EDITION, 1916.

CAUTION WHEN APPROACHING BRITISH PORTS.

(To be inserted inside cover of all Sailing Directions.)

PART I.—CLOSING OF PORTS.

(1) My Lords Commissioners of the Admiralty having taken into consideration the fact that it may be necessary to forbid all entrance to certain ports of the Empire, this is to give Notice that on approaching the shores of the United Kingdom, or any port of the British Empire, a sharp lookout should be kept for the signals described in the following paragraph; and for the vessels mentioned in paragraph (4), Part II., of this Notice, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) If entrance to a port is prohibited, three *red* vertical lights by night, or three *red* vertical balls by day, will be exhibited in some conspicuous position in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (4), Part II., of this Notice.

If these signals are displayed, vessels must either proceed to the position marked "Examination Anchorage" on the Admiralty Charts and anchor there, or keep the sea.

PART II.—EXAMINATION SERVICE.

(3) Under certain circumstances, it may become necessary to take special measures to examine vessels desiring to enter the ports or localities at home or abroad, referred to in Notices to Mariners No. 1 of 1915 and subsequent years.

(4) In such case, vessels carrying the distinguishing flags or lights mentioned in paragraph (6) will be charged with the duty of examining ships which desire to enter the ports and of allotting positions in which they shall anchor. If Government vessels, or vessels belonging to the local port authority, are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on which they should approach the Examination Anchorage. Such communication will not be necessary in cases where the pilot on board has already received this information from the local authorities.

(5) As the institution of the Examination Service at any port will never be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (6), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

In entering by night serious delay and risk will be avoided if four efficient all round lamps, two *red* and two *white*, are kept available for use.

(6) By day the distinguishing flags of the Examination Steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign.

Also, three *red* vertical balls if the port is closed.

By night the steamer will carry: (a) Three *red* vertical lights if the port is closed; (b) three *white* vertical lights if the port is open.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(7) Masters are warned that, when approaching a British port where the Examination Service is in force, they must have the distinguishing signal of their vessel ready to hoist immediately the Examination Steamer makes the signal.

(8) Masters are warned that, before attempting to enter any of these ports when the Examination Service is in force, they must in their own interests strictly obey all instructions as to entry given to them by the Examination Steamer. In the absence of any instructions from the Examination Steamer they must proceed to the position marked "Examination Anchorage" on the Admiralty Charts, and anchor there, or keep the sea.

Whilst at anchor in the Examination Anchorage, Masters are warned that they must not lower any boats (except to avoid accident), communicate with the shore, work cables, move the ship, or permit anyone to leave the ship, without permission from the Examination Steamer.

(9) In case of fog, Masters of vessels are enjoined to use the utmost care, and the Examination Anchorage itself should be approached with caution.

(10) Merchant vessels when approaching British ports are specially cautioned against making use of private signals of any description, either by day or night: the use of them will render a vessel liable to be fired on.

(11) The pilots attached to the ports will be acquainted with the regulations to be followed.

(To face Cautionary Notice in all Sailing Directions.)

NOTATIONS OF SUPPLEMENTS AND ANNUAL
SUMMARIES OF NOTICES TO MARINERS
RELATING TO THIS BOOK.

To be filled in by Navigating Officer.

[In Chart Dépôts the two first columns are alone to be filled up.]

Title.	Date of Publication and Number.	Whether pasted in or noted in Margins of Book, and Date of each Correction.

NOTICE.

HYDROGRAPHIC DEPARTMENT, ADMIRALTY.

Early in each year the information affecting this book, which has been published during the preceding year in the Admiralty Notices to Mariners, is compiled and issued as a separate publication. If a Supplement has been issued during the year, this publication will only include Notices issued since the date of the Supplement. Mariners are advised to procure copies of these publications. They can be obtained gratuitously from the Admiralty Agent or Sub-Agents for the sale of charts on presentation of the coupons on the next page, either personally or by letter. In the latter case the cost of postage must be enclosed.

The Supplements to this book which may be published can also be obtained in a similar manner on presentation of the coupons below.

Revised Supplement (2) to
CHINA SEA PILOT,
VOL. I., 1916.

Revised Supplement to
CHINA SEA PILOT,
VOL. I., 1916.

Supplement to
CHINA SEA PILOT,
VOL. I., 1916.

NOTICE

ATTORNEY GENERAL DEPARTMENT, ADVERTISING

There is no doubt that the advertising industry is one of the most important and profitable in the world. It is the lifeblood of commerce and industry, and it is the only way in which the public can be kept informed of the latest news and events. The advertising industry is a vast and complex one, and it is one that is constantly growing and changing. It is a industry that is essential to the success of any business, and it is one that is constantly evolving. The advertising industry is a vast and complex one, and it is one that is constantly growing and changing. It is a industry that is essential to the success of any business, and it is one that is constantly evolving.

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Advertising Department	1000
Public Relations	500
Marketing	200
Sales	100

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during 1925, affecting
CHINA SEA PILOT, VOL. I., 1916.

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Summary of Notices to Mariners published
during 1946 affecting
China Sea Pilot, Vol. I, 1916

Gt. Brit. Hydrographic Office.

THE
CHINA SEA PILOT,
VOL. I.

CONTAINING
DIRECTIONS FOR THE APPROACHES TO
THE CHINA SEA,
BY MALACCA AND SINGAPORE STRAITS,
AND INCLUDING
THE WEST COAST OF SUMATRA.

FIRST EDITION.

ALL BEARINGS ARE TRUE.

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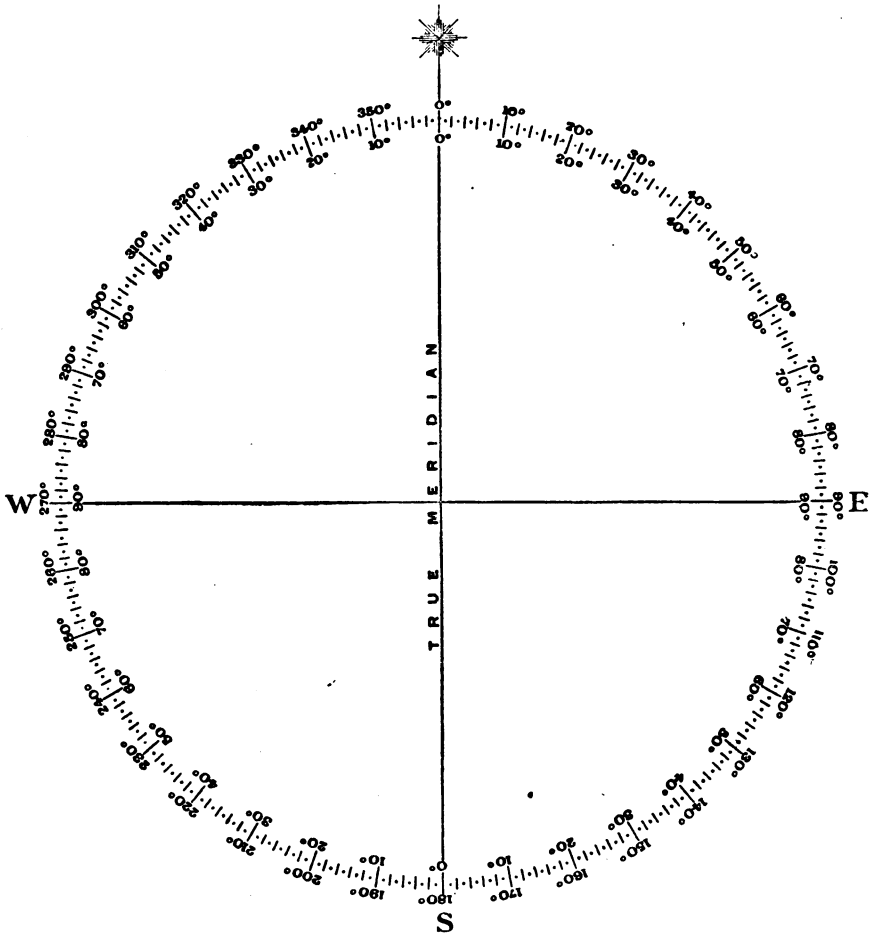
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1916.

Price Three Shillings.

TRUE BEARINGS.

Diagram to facilitate the conversion of True Bearings expressed in degrees of the circle from 0° to 360° into True Bearings expressed in degrees of the quadrant from 0° to 90° .



65-6
G79c

ADVERTISEMENT TO THE FIRST EDITION OF VOL. I. OF THE CHINA PILOT.

The China Sea Pilot consists of five volumes; this volume (I.) treats of the northern approach to Malacca strait, and through that strait to Singapore strait and entrance to the China sea, and including the northern, north-eastern, and western coasts of Sumatra island. The surveys of the large extent of the west coast of Sumatra is still imperfect.

Information for this work has also been gathered from Notices published by Colonial authorities, by the Netherlands India Government, and the Remark Books of H.M. Vessels employed on the China Station.

The latest publications of the volumes relating to this work have been used in its compilation by Captain C. H. C. Langdon, R.N., and are mentioned on the following page.

All bearings are true, and in degrees from 0° (North) to 360°, reckoned clockwise.

All details of lights and fog signals have been omitted; for these the Admiralty List of Lights must be consulted.

Mariners are invited, in the interests of navigation, to forward to the Hydrographic Department, Admiralty, London, S.W., any information that may come under their notice which may be useful for the correction of the charts and other hydrographic publications issued by the British Admiralty; early advice as to newly discovered dangers, the establishment of, or changes in, any aids to navigation, is especially requested.

Copies of a form (H. 102) on which to render information can be obtained gratis from the Admiralty chart agent—

Mr. J. D. Potter,

145, Minories, London, E.C.

—or any of his sub-agents in Great Britain and abroad, lists of whom will be found at the end of this volume.

The publication of this volume cancels China Sea Directory, Vol. I., fifth edition; Revised Supplement, 1913; and all Notices to Mariners relating to that work up to, and including, No. 22 of 1916.

J. F. PARRY,

*Captain, R.N.,
and Hydrographer.*

*Hydrographic Department,
Admiralty, London,
22nd January, 1916.*

BIBLIOGRAPHY.

Authorities consulted in the compilation of this volume:—

Zeemansgids voor den Oost Indischen Archipel, Deel II., derde druk Gravenhage, 1913.

Zeemansgids voor den Oost Indischen Archipel, Deel I., derde druk Gravenhage, 1912.

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GLOSSARY OF A FEW USEFUL TERMS IN THE MALAY,
ACHINESE, AND SIAMESE LANGUAGES.

Malay.	English.	Malay.	English.
Alang Alang -	Reeds.	Lamong -	Buoy.
Api -	Fire.	Laut, Laut besar -	Sea.
Arang -	Coal.	Layar -	Sail.
Arus -	Current.	Lumpur -	Mud.
Ayer -	Fresh water.	Malan, or Malang -	A rock a little above high water.
— masin -	Salt water.	Merah -	Red.
— pasang -	Flood or high tide.	Muara -	Mouth of a river.
— surat -	Ebb or low tide.	Nangka -	Jack fruit.
Bagan -	Fishing village.	Nipa -	Small marsh palm.
Baharu -	New.	Padang -	Plain, open space.
Batu -	Rock, stone.	Padi -	Rice in the straw.
Benting -	Fort.	Panjang -	Long, tall.
Beri-beri -	A disease.	Pasang besar -	High tide.
Besar -	Large, Great.	— kring -	Low tide.
Besi -	Iron.	— naik -	Flood tide.
Beting -	Shoal, Sandbank.	— surut turun -	Ebb tides.
Bukit -	Hill.	Pasir -	Sand, shoal.
Burung -	Bird.	Pinang -	Betel nut.
Dalam -	Deep.	Pisang -	Banana.
Dammar -	Gum.	Ponchak -	Peak of a hill.
Dapur -	Cooking place.	Prau -	Native boat.
Darat -	Coast, land.	Pulo -	Island.
Gadong -	House.	Putih -	White.
Gampier -	The juice of a native plant.	Rantau -	Reach of a river.
Glé -	Hill, mountain.	Rotan -	Rattan cane.
Goh, or Koh -	Island.	Sampan -	Small boat.
Gunong -	Mountain.	Sawa -	Dry rice field.
— api -	Volcano.	Selat -	Channel, strait.
Gusong -	Reef of rocks.	Seros -	Fishing stakes or enclosures.
Ikan -	Fish.	Sungi -	River, stream.
Itam or Hitam -	Black.	Tanah -	Land, country, earth.
Jalan -	Road.	Tanjong -	Cape, point, promontory.
Jalur -	Native boat.	Tasik -	Lake.
Jambatan -	Mole, jetty.	Tekong -	Reef.
Jemara -	Casuarina tree.	Telok or Teluk -	Bay, cove, creek.
Jermals -	Fishing enclosures.	Tepilaut -	Coast, seaboard.
Kampong -	Village.	Timbaga, tembaga -	Copper.
Kapal -	Ship.	Toko -	Store.
Karang -	Coral reef, rock.	Tripang -	Bêche-de-mer (edible sea slug).
Kedei -	Town, large village.	Trumbu or terumbu -	A sunken rock.
Kelapa -	Cocoa-nut.	Trusan -	Channel, passage.
Kechil -	Little, small.	Ujong -	Cape, point, promontory.
Kotta or Kota -	Town.		
Krung -	River.		
Kuala, Kuala -	Mouth of a river.		
Labuan -	Anchorage, harbour.		

PRINCIPAL POINTS OF THE COMPASS (MALAY).

Utara -	North.	Salatan -	South.
Utara-samatatimor -	N.N.E.	Salatan-daya -	S.S.W.
Timor-laut -	N.E.	Barat-daya -	S.W.
Timor-samatautara -	E.N.E.	Barat-samata-	
Timor -	East.	salatan -	W.S.W.
Timor-tanggara -	E.S.E.	Barat-tapat -	West.
Tanggara -	S.E.	Barat-samatautara -	W.N.W.
Salatan-tanggara -	S.S.E.	Barat-laut -	N.W.
		Utara-barat-laut -	N.N.W.

SYSTEM OF ORTHOGRAPHY.

Adopted by the Admiralty for Sailing Directions and Charts.

As it is highly desirable that all officers of His Majesty's Navy and others should be able, on consulting the Admiralty Charts, to at any rate approximate to the correct pronunciation of words that they find therein written, it is necessary, in consequence of the multiplicity of sounds attached to nearly every combination of letters in the English language, to adopt an arbitrary system of orthography for the spelling of all geographical names in languages which are not habitually written in the Roman character.

The system adopted and described herein, originally introduced by Admiral Washington, has been accepted by the Royal Geographical Society, and all public departments in Great Britain, as well as by the United States.

As far as has been found possible with existing knowledge, native names are spelt in accordance with this system, which has been for some years in process of gradual introduction into all Admiralty Sailing Directions and Charts.

No change is made in the orthography of foreign names in countries which use Roman letters; thus French, Spanish, Portuguese, Dutch, &c., names will be spelt as by the respective nations.

1. Where native names have been so long written in a form which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained.

2. The true sound of the word, as locally pronounced, is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system, which would attempt to represent the more delicate inflections of sound and accent, would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English; *every letter being pronounced*. Two accents only are used:—

- (1.) The acute, to denote the syllable on which stress is laid. The use of this is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."
- (2.) The sign \sim over the letter *u* to denote the short sound of that vowel under certain circumstances. (*See table.*)

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*.

The amplification of the rules is given on the following pages.

Information is invited as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system.

Letters.	Pronunciation and Remarks.	Examples.
a	<i>ah</i> , <i>a</i> as in <i>father</i> - - - - -	Java, Banána, Somáli, Bari.
e	<i>eh</i> , <i>e</i> as in <i>bet</i> ; <i>a</i> as in <i>fate</i> . - - - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English <i>e</i> ; <i>i</i> as in <i>ravine</i> ; the sound of <i>ee</i> in <i>beet</i> . Thus, not <i>Feejee</i> , but	Fiji, Hindi.
o	<i>o</i> as in <i>mote</i> - - - - -	Tokyo.
u	long <i>u</i> as in <i>flute</i> ; the sound of <i>oo</i> in <i>boot</i> . <i>oo</i> or <i>ou</i> should never be employed for this sound. Thus, not <i>Zooloo</i> or <i>Zoulou</i> , but	Zulu, Sumatra.
	The shorter sound of the different vowels, when necessary to be indicated, can be expressed by doubling the consonant that follows. The sounds referred to are as follows :— The short <i>a</i> as in <i>fatter</i> , as compared with the long <i>a</i> as in <i>father</i> . The short <i>e</i> as in <i>better</i> , as compared with the long <i>e</i> as in <i>fate</i> . The short <i>i</i> as in <i>sinner</i> , as compared with the long <i>i</i> as in <i>ravine</i> . The short <i>o</i> as in <i>sobbing</i> , as compared with the long <i>o</i> as in <i>sober</i> . The short <i>u</i> as in <i>rubber</i> , as compared with the long <i>u</i> as in <i>rubric</i> .	Yarra, Tanna, Mecca, Jidda, Bonny.*
ū	is the same short sound of <i>u</i> as is denoted by doubling the consonant following, but is used, and only used, where such doubling is impossible, as in the case of words where <i>u</i> is followed by two different consonants, as in <i>Tūng</i> , pronounced as the English <i>tongue</i> . Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulúa, Oosima.
ai	English <i>i</i> as in <i>ice</i> - - - - -	Shanghai.

* The *y* is retained as a terminal in this word under Rule 1. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
au	<i>ow</i> as in <i>how</i> . Thus, not <i>Foochow</i> , but	Fuchau.
ao	is slightly different from <i>au</i> - - -	Macao.
aw	when followed by a consonant or at the end	
	of a word, as in <i>law</i> - - - thus	Cawnpore.
ei	is the sound of the two Italian vowels, but	Beirút, Beilul.
	is frequently slurred over, when it is	
	scarcely to be distinguished from <i>ey</i> in	
	the English <i>they</i> , or <i>ei</i> in <i>eight</i> .	
b	English <i>b</i> .	
c	is always soft, but is so nearly the sound of	Celébes.
	<i>s</i> that it should be seldom used.	
	If <i>Celébes</i> were not already recognised it	
	would be written <i>Selébes</i> .	
ch	is always soft, as in <i>church</i> - - -	Chingchin.
d	English <i>d</i> .	
f	English <i>f</i> . <i>Ph</i> should not be used for the	
	sound of <i>f</i> . Thus, not <i>Haiphong</i> , but	Haifong, Nafa.
g	is always hard. (Soft <i>g</i> is given by <i>j</i>) -	Galápagos.
h	is always pronounced when used.	
hw	as in <i>what</i> ; better rendered by <i>hw</i> than <i>wh</i> ,	Hwang ho,
	or <i>h</i> followed by a vowel. Thus, <i>Hwang</i>	Ngan hwei.
	<i>ho</i> , not <i>Whang ho</i> or <i>Hoang ho</i> .	
j	English <i>j</i> . <i>Dj</i> should never be put for this	Japan, Jinchuen.
	sound.	
k	English <i>k</i> . It should always be put for the	
	hard <i>c</i> . Thus, not <i>Corea</i> , but	Korea.
kh	The Oriental guttural - - -	Khan.
gh	is another guttural, as in the Turkish -	Dagh, Ghazi.
l	} As in English.	
m		
n		
ng		
	has two separate sounds, the one hard as in	
	the English word <i>finger</i> , the other as in	
	<i>singer</i> . As these two sounds are rarely	
	employed in the same locality, no attempt	
	is made to distinguish between them.	
p	As in English.	
ph	As in <i>loophole</i> - - -	Mokpho,
		Chemulpho.
th	stands both for its sound in <i>thing</i> , and as	
	in <i>this</i> . The former is most common -	Bethlehem.
q	should never be employed; the sound of <i>qu</i>	Kwangtung.
	in <i>quiver</i> is given as <i>kw</i> . When <i>qu</i> has	
	the sound of <i>k</i> , as in <i>quoit</i> , it should be	
	given by <i>k</i> .	
r	As in English.	
s	As in <i>sin</i> .	
sh	} As in English.	
t		
v		
w		
x		Sawákin.

Letters.	Pronunciation and Remarks.	Examples.
y	is always a consonant, as in <i>yard</i> , and therefore should never be used as a terminal, <i>i</i> or <i>e</i> being substituted. Thus, not <i>Mikindány</i> or <i>Wady</i> , but not <i>Kwaly</i> , but	Kikūyu. Mikindáni, Wadi. Kwale.
z	English z - - - - -	Zulu.
zh	French <i>j</i> , or as <i>s</i> in <i>treasure</i> - - - - - Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an <i>acute accent</i> .	Muzhdaha. Tongatábu, Galápagos, Paláwan, Saráwak.

In the case of native names in countries under the dominion of other European powers, in whose maps, charts, &c., the spelling is given according to the system adopted by that power, such orthography is, as a rule, disregarded, and the names are spelt according to the British system. Thus the island east of Java in possession of the Dutch is spelt *Madoera* by them, but on Admiralty charts *Madura*. A town in Java appears on Dutch charts as *Tjilatjap*; in the British, *Chilachap*.

When a foreign language is written in a vocabulary of fixed sounds, so as to permit of transliteration into the British system, a table of equivalents for each letter is drawn up, and names of places can be transliterated without regard to pronunciation.

It is rarely, however, that any language is absolutely without variation in the sound of any letters or combination of letters. This system therefore requires care. The rules for such transliterations so far adopted by the Admiralty are here given.

To reduce Greek names to the orthographic form, required by the foregoing system, would require so many changes that it has been decided to defer the revision of Admiralty publications until the system has been more generally introduced and used.

The Greek names are therefore left for the present in their old shape, but these give in most cases a very erroneous idea of the sound of the names, as pronounced by Greeks, and in many cases the present spelling gives a clue to the pronunciation by aid of the table of equivalents.

Thus *Ευβοία* now spelt *Eubœa* is pronounced *Evvia*.
 „ *Χαλκίς* „ *Chalcis* „ *Khalkis*.
 „ *Κεφαλληνία* „ *Cephallonia* „ *Kefallinia*.

Whenever *C* appears in a Greek name as at present written it may be taken for granted it has the sound of *K*.

Greek Letters		Roman Equivalents by System	Greek Letters		Roman Equivalents by System
Α	α	a	Ρ	ρ	r
Β	β	v	Σ	σ	s
Γ	γ	g	Τ	τ	t
Δ	δ	d	Υ	υ	i
Ε	ε	e	Φ	φ	ph
Ζ	ζ	z	Χ	χ	kh
Η	η	i	Ψ	ψ	ps
Θ	θ	th	Ω	ω	o
Ι	ι	i	ΑΙ	αι	ei
Κ	κ	k	ΕΙ	ει	i
Λ	λ	l	ΟΙ	οι	i
Μ	μ	m	ΟΥ	ου	u
Ν	ν	n	ΥΙ	υι	i
Ξ	ξ	x	ΑΥ	αυ	aph, av
Ο	ο	o	ΕΥ	ευ	eph, ev
Π	π	p	ΗΥ	ηυ	iph, iv

In the transliteration of names in India and the Persian Gulf, the rules adopted by the Indian Government have been adopted, excepting that where the letter Q not followed by "u" is used in that system, the letter K is substituted.

In the transliteration of Malay or other native names from Dutch charts where they are spelt according to Dutch orthography—

Dj has been rendered by J,
Tj " " " Ch,
oe }
oo } " " " U,
ou }
ee " " " E.

J in the middle of a word if followed by oe has been rendered by Y though not always. Ij has been rendered by ai generally.

For Chinese names, the Wade system of spelling, as modified in Playfair's "Cities and Towns of China," is adopted as a basis, being transliterated into this system in the following manner—

For CH', K', T', TS', TZ', write CH, K, T, TS, and TZ.
,, Chieh write Chie.

For Ê, if pronounced short as in CHÊN, FÊN, &c., write Ū, or U followed by a double consonant.

For Ê terminal, as in CHÊ, LÊ, &c., write AW.
For Eh write E.
,, ÊI write EI.

For ÊRH write URR.

„ HUA write HWA.

„ HUI write HWEI.

„ HUO write HWAU.

„ J write ZH.

„ KUA write KWA.

„ K'UA write KWA.

„ KUEI write KWEI.

For K'UEI write KWEI.

„ KUO write KWAW.

„ O write AW.

„ OU write O.

„ P' write PH.

„ SSŪ write SE.

„ Ū write U.

„ Ŭ write E.

In this system the Manchurian dialect is adopted as the basis ; but with regard to names in the provinces of FU KIEN, KWANG TUNG and KWANGSI, the local pronunciation should be followed as a guide for the spelling. CHIH and SHIH, pronounced somewhat as the shi in shirt, have been retained, as the sounds are difficult to express according to the Royal Geographical Society's rules. Canton and Peiho are to be spelt in this, the customary way.

The following table gives the equivalents used by the Admiralty in the transliteration of Russian names :—

Printed Characters	Italic Characters	Equivalents in Adm. System	Remarks	Printed Characters	Italic Characters	Equivalents in Adm. System	Remarks
А а	<i>A a</i>	<i>a</i>		Т т	<i>T t</i>	<i>t</i>	
Б б	<i>B b</i>	<i>b</i>		У у	<i>U y</i>	<i>u</i>	
В в	<i>B v</i>	<i>v</i>		Ф ф	<i>Φ φ</i>	<i>f</i>	
Г г	<i>Γ γ</i>	<i>g(h)</i>	<i>If g, always hard If h, as in English</i>	Х х	<i>X x</i>	<i>kh</i>	
Д д	<i>Δ δ</i>	<i>d</i>		Ц ц	<i>Ц ц</i>	<i>tz</i>	
Е е	<i>E e</i>	<i>e(ye)</i>	<i>e in bet (ye when initial)</i>	Ч ч	<i>Ч ч</i>	<i>ch</i>	
Ж ж	<i>Ж ж</i>	<i>zh</i>	<i>Sound of French j or z in azure.</i>	Ш ш	<i>Ш ш</i>	<i>sh</i>	
З з	<i>З з</i>	<i>z</i>		Щ щ	<i>Щ щ</i>	<i>shch</i>	<i>shch in Russian church</i>
И и	<i>I u</i>	<i>i</i>		Ъ ъ	<i>Ъ ъ</i>	<i>mute</i>	<i>Omit in transliteration in middle of a word as end . . .</i>
І і	<i>I i</i>	<i>i</i>		Ы ы	<i>Ы ы</i>	<i>{yi}</i>	
К к	<i>K k</i>	<i>k</i>		Ь ь	<i>Ь ь</i>	<i>mute</i>	<i>Omit in transliteration</i>
Л л	<i>L l</i>	<i>l</i>		Ѣ ѣ	<i>Ѣ ѣ</i>	<i>ye</i>	
М м	<i>M m</i>	<i>m</i>		Э э	<i>Э э</i>	<i>e</i>	<i>a in fate</i>
Н н	<i>H n</i>	<i>n</i>		Ю ю	<i>Ю ю</i>	<i>yu</i>	
О о	<i>O o</i>	<i>o</i>		Я я	<i>Я я</i>	<i>ya</i>	
П п	<i>P n</i>	<i>p</i>		Ө ө	<i>Ө ө</i>	<i>f</i>	
Р р	<i>P p</i>	<i>r</i>		У у	<i>У у</i>	<i>œ</i>	<i>Seldom used</i>
С с	<i>C c</i>	<i>s</i>		Ѩ Ѩ	<i>Ѩ Ѩ</i>	<i>i</i>	

Note. The combinations ЫІ and ІІ should be transliterated i.

INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND GENERAL NAVIGATION.

ON THE CORRECTION OF CHARTS, SAILING DIRECTIONS, AND LIGHT LISTS.

THE three descriptions of publications as guides to navigation, which are affected by the continual changes and alterations that take place, are the Charts, the Sailing Directions, and the Light Lists.

Of these the Charts should always be, so far as our knowledge permits, absolutely correct to date; the Sailing Directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the largest scale chart must be taken as the guide for navigation.*

The Light Lists are published annually.

1. Charts.—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Department they are correct to the date of issue as stamped on each folio. They then receive such corrections by hand in the dépôts as are required, and are so issued to the ships.

The charts in the folios should have the same number and title as shown against each in the Lists pasted on the outside of the folio. The Navigating Officer is to satisfy himself that they do so agree before signing the receipt for the charts, &c.

All small but important corrections affecting navigation that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer, in accordance with the following uniform system:—

1. All corrections, additions to, erasures on Charts are to be neatly made in red (except as explained in paragraph 10 *d*). In every case the recognised Chart abbreviations are to be used. (*See Admiralty Chart D. 11.*)

2. The number and date of every Notice to Mariners, from which corrections, &c., as above, have been made, are to be entered in red at the lower left-hand corner of the Chart, in the following manner, viz.:—

(07) 123, 1145, 1503; (08) 232; (10) 1506, 1721; (11) 34, &c., and in no other place or form (except as explained in paragraph 10 *d*).

3. *General Remarks.*—The amount of information to be inserted on a Chart is to be in accordance with that already engraved on such Chart.

4. *The year date* is to be inserted against wrecks, reported shoals, channels dredged, depth of water on bars or in shifting channels, and irregularity of lights, but only on the largest scale chart affected.

5. *On the Coast Charts* full particulars of lights and fog signals are to be inserted where possible, omitting minor details of lights and fog signals of harbours.

6. *On Charts of smaller scale than Coast Charts* lights and fog signals of harbours are not to be inserted, and particulars of other

lights and fog signals are to be lessened as the scale of the Chart decreases, omitting details in the following order:—

For lights—(1) Height, (2) Period, (3) No. in Group, (4) Visibility, thus:—

Lt. Gp. Fl., (3) Red. ev. 20 sec. 150 ft., vis. 12 m.

(1) Lt. Gp. Fl., (3) Red. ev. 20 sec. vis. 12 m., (2) Lt. Gp. Fl., (3) Red. vis. 12 m.

(3) Lt. Gp. Fl. Red. vis. 12 m., (4) Lt. Gp. Fl. Red.

For fog signals, thus:—(1) Fog Siren, 2 ev. min., (2) Fog Siren, ev. min., (3) Fog Siren.

7. *On Ocean Charts* lights visible 15 miles or over are alone to be inserted, and then only their character and colour, *e.g.*, Lt. Alt., Lt. Gp. Fl., Lt. Occ., Lt. F.R.

8. *Light-buoys*.—No period is to be inserted against a light-buoy except in large scale plans; on ordinary scales only the character, *e.g.*, Lt. Occ., Lt. Fl.

9. *On Coast Charts* inner harbour buoys and beacons are not to be inserted, and on small scale coast charts only the outer buoys.

10. *Arrangement of Writing, &c.*—Writing is to be as much as possible clear of the water, unless the objects referred to are on the water:—

- (a) When inserting corrections, care must be taken not to obliterate any of the other information already on the chart.
- (b) When "Notes" are to be inserted (such as Cautionary, Tidal, &c.), they should be written in a convenient but conspicuous place, where they will not interfere with any other details.
- (c) *Erasures* are never to be made. Where necessary, the details to be corrected are to be crossed through in red ink.
- (d) *Temporary or intended changes* are to be inserted on the chart in pencil, with the number and year of the Notice to Mariners against them, thus:—N. to M. $\frac{43}{1913}$ temp. (which is also to be repeated in pencil *below* the "small corrections" dates at the lower left-hand corner of the chart), and in the case of intended changes, the particulars finally inked in, in red, when further notice has been received that the changes have been made. In the case of temporary changes, the pencil notations are to be rubbed out when a further Notice has been received cancelling them.

Charts, when received from a Chart Depôt or direct from the Hydrographic Department, will *not* have received the above-mentioned pencil corrections, but on first supply of a Chart Set, a copy of the latest Notice to Mariners, containing a List of all Notices to Mariners of a Temporary character and Preliminary Notices which are still in force *by which any Charts are temporarily affected*, will be specially handed to the Navigating Officer or attached to Chart Set, and the first duty of the Navigating Officer will be to make the necessary corrections in pencil to the charts affected.

11. One copy of all Notices to Mariners is to be pasted into the Sailing Directions, in its appropriate place, so that if fuller detail is required than what the scale of the chart permits to be given, it will be found on the proper page referring to the given locality or subject.

12. Unmounted Sets of Charts supplied for the personal use of the Admiral, Atlas folios supplied for information of Officers and Junior Officers, and Charts for Ships' Company, are stamped, "Not to be used for Navigation," and need not, therefore, be kept corrected.

2. Sailing Directions are not corrected before issue, but on page iii. in the "Advertisement" to each volume will be found the number of the last Notice to Mariners used in its revision; the numbers of the subsequent Notices affecting it between going to press and issue to H.M. Ships are given in the Notice to Mariners announcing its publication.

Supplements and Revised Supplements referring to each volume are published from time to time. Supplements contain all the information received up to date since the publication of the volume to which they refer, and a Revised Supplement cancels the previous Supplements.

The existence of a Supplement is to be noted in the tabular form placed for the purpose inside the cover of each volume, and also on receipt of a further Revised Supplement after commission. Two copies are issued to each ship, one of which is to be retained intact, for reference, notations referring to it being made on the pages of the Sailing Directions affected; the other copy may be cut up, if considered desirable, the slips being pasted in the volume at the appropriate place.

In the advertisement to each Supplement will be found the number of the last Notice to Mariners used in its compilation.

In January of each year, a summary of the information affecting each volume of Sailing Directions, which has been published during the preceding year in Notices to Mariners, is issued as a separate publication. If a Supplement or Revised Supplement has been issued during the year, or is in preparation, this summary will only include Notices to Mariners issued since the date of such Supplement.

Notices to Mariners prior to the date of issue of a Chart Set from a Chart Dépôt are supplied with the set, to complete the interval between the last published Supplement, Revised Supplement, or Summary of Notices to Mariners, and the issue of the Chart Set, and an early duty of the Navigating Officer after drawing a Chart Set is to correct the Sailing Directions from the Supplements or Revised Supplements, Annual Summaries of Notices to Mariners, and Notices to Mariners supplied with the Chart Set.

One copy of each Notice to Mariners should be pasted into the Sailing Directions in its appropriate place as soon as received.

It must, however, be thoroughly understood that Sailing Directions will never be correct in all minor details, except up to the date of the last Supplement or Revised Supplement, and that, when differences exist, the charts, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

3. The Light Lists, published annually early in each year, are not corrected in the dépôts before issue, but appendices are issued every week with the weekly copies of Notices to Mariners, giving the alterations that have taken place.

It is the duty of the Navigating Officer when he receives the Chart Set to make notations in the Light Lists from these appendices, and from Notices to Mariners of later date; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the lights are not described in the Sailing Directions. A red label to this effect is inserted opposite page 1 of all Sailing Directions. The charts also may not be equally up-to-date in some details, for which no Notices to Mariners have been issued.

THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Reliance on a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of Coast sheets, which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the only method of ascertaining the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends it only ascertains the depth of water over an area equal to the diameter of the lead, that is about two inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a width of two inches.

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instance, a general survey of a coast which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor, are made on a scale of three inches to the mile, and surveys of frequented ports, or harbours likely to be used by Fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale Coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, *i.e.*, of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper:—

16	15	15	13	13	14	12	11	10	9
14	15	14	14	13	13	12	11	9	8
15	15	14	17	16	14	13	10	10	9
16	16	17	16	16	12	11	8	9	10
18	17	15	12	9	7½	7½	7½	9	10
19	16	12	9	5½	4½	5½	6½	8½	9
22	19	16	10	5½	5½	6½	7½	8½	10
20	16	12	7½	5½	6½	6½	7½	8½	10
18	15	11	9	7½	7	7½	8½	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear weather, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may occasionally escape detection.

Lines of soundings plotted as close as may be practicable on a scale of 6 inches to the mile would be 100 feet apart, and each line would be only 2 inches in actual width.

Thus, in a chart on a scale of one inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape the lead; whilst in a chart on a scale of 6 inches, inequalities as large as battle-ships, if lying parallel to, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General Coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the contour line of 10 fathoms, without taking every precaution to avoid a possible danger; and even with surveys of harbours on a scale of 6 inches to the mile, vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead will not rest on them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear, unless it is shown to be foul, the contrary should be assumed.**

2. Fathom Lines a Caution.—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, as before mentioned, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. Chart on largest scale always to be used.—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

4. Caution in using Small Scale Charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. Graduation.—All Plans are now being graduated in skeleton style before publication in order to facilitate easy reference to Astronomical positions; previously published plans are also graduated as opportunity offers. The graduation is, however, of necessity, often based upon imperfect information of a conflicting nature; for this reason, whenever an Astronomical position is quoted other than approximate (*i.e.*, when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived.

6. Distortion of Printed Charts.—The paper on which charts are printed has to be damped. On drying, distortion takes place from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect

navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion.

7. Buoys.—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

Light-buoys.—The lights shown by light-buoys cannot be implicitly relied on, as, if occulting or flashing, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British islands are from 5 to 217 candle power.

8. Lights.—Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height, at the beginning of each Light List, affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, or candle power, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See table in Light List before mentioned.*)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

9. Fog Signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the fog signal station, in some instances even when in close proximity to it. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a station until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be made. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck. Under certain conditions of the atmosphere, when a fog signal is a combination of high and low notes, one of the notes may be inaudible.

The mariner should not assume—

- a. That because he fails to hear the sound, he is out of hearing distance.
- b. That, because he hears a fog signal faintly, he is at a great distance from it.
- c. That, because he hears the sound plainly, he is near it.
- d. That, because he does not hear it, even when in close proximity, the fog signal has ceased sounding.
- e. That the distance from and the intensity of the sound on any one occasion, are a guide to him for any future occasion.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

10. Tides and Tidal Streams.—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off-shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by about three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, Tidal diagrams to show the height of the tide at any time for any place, given in the Tide Tables, will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the mean level of low water springs. This always occurs on the coasts of Europe at the equinoxes, but in other parts of the world, and especially in the tropics, such periodic low tides may coincide more frequently with the solstices. Wind or a high barometer may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

11. Arrows on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the

direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

12. Fixing position.—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are supplied with a station-pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment: First, that the objects be well chosen; and, second, that the observer is skilful and rapid in his use of the sextant and station-pointer.

For the former, reference can be made to the pamphlet on the use of the station-pointer, which is in every chart box; the latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or gun-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart of fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart, as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, allowing for current, gives an excellent fix for a departure but does not ensure safety, as the point and probably the rocks off it are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current.

This is, however, only strictly true if the current is directly with or against the course of the ship. If a cross current has to be allowed for, the results by this method may be altogether erroneous and misleading. The following example shows in a tabular form the errors that might be produced by accepting the distance run in the interval, allowing for current, as the distance of the object at time of second bearing.

Example: A vessel steering East sights a light bearing E.N.E., or two points on the bow; one hour after, having run in the interval 10 miles by log, the light bears N.E., *i.e.*, she has doubled the angle on the bow. Current, in all cases, at the rate of 2 miles an hour.

Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing	Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing
	By Log	Allowing for Current			By Log	Allowing for Current	
	Miles	Miles	Miles		Miles	Miles	Miles
East -	10	12	12	West -	10	8	8
E.N.E. -	10	11.8	10	W.S.W. -	10	8.2	10.2
N.E. -	10	11.4	8	S.W. -	10	8.7	11.9
N.N.E. -	10	11	6.2	S.S.W. -	10	9.4	13.6
North -	10	10.2	5.3	South -	10	10.2	14.7
N.N.W. -	10	9.4	4.9	S.S.E. -	10	11	15
N.W. -	10	8.7	5.3	S.E. -	10	11.4	14.7
W.N.W. -	10	8.2	6.1	E.S.E. -	10	11.8	13.8

The following rule should be observed in all cases of a cross current, viz.:—

When the angle between the second bearing and the course made good (over the ground) is double the angle between the first bearing and the course made good (over the ground) the distance from the object is equal to the distance made good (over the ground) between the times of the first and second bearings.

To get a reliable result the difference between the first bearing and the course made good (over the ground) should never be less than 20°. It follows, therefore, that it is necessary, before observing the first bearing, to decide upon the course being made good (over the ground). This may be done as follows, viz.:—

From any point, A, on the chart draw a line A B, representing by its direction the course steered and by its length the speed through the water. From the point B, draw another line, B C, representing in a similar manner the estimated direction and rate of the current, &c., to be allowed for. Then a line joining the points A and C will represent in the same manner the course and speed which are being made good (over the ground).

A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is supplied with all chart sets.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude or longitude) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. A deep cast of the lead at the same time may often serve to give an approximate position on the line. An early and very accurate position can also be obtained by Sumner's method, by getting a Sumner line by a bright star at daylight when the horizon is well visible, and another Sumner line by the sun when a few degrees above the horizon, or, better still, by observing two or more stars at twilight. The Sumner lines thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

13. Change of Variation of the Compass.—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles, and in the English Channel about 5° in 400 miles. The Variation Chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation Chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses.

14. Local Magnetic Disturbance of the Compass on board Ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force

of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

15. Use of Oil for Modifying the Effect of Breaking Waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.
4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
5. It is useful in a ship or boat, both when running, or lying to, or in wearing.
6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides; if used only aft the tow alone gets the benefit.

16. Concise Rules for Revolving Storms:—

1. Revolving storms are so named because the wind in these storms revolves round an area of low pressure situated in the centre. They have also local names, and are termed hurricanes in the West Indies and South Pacific Ocean; cyclones in the Indian Ocean, Bay of Bengal, and Arabian Sea; and typhoons in the China Sea.

2. In these storms the wind always revolves the same way in the same part of the world, that is, against the movement of the hands of a watch in the northern hemisphere, and with the hands of a watch in the southern hemisphere. The wind does not revolve in circles, but has a spiral movement, inwards, towards the centre.

3. Revolving storms have also, as a general rule, a progressive movement. Within the tropics they usually move from east to west at first, and then curve towards the pole of the hemisphere in which the storm is generated, and afterwards move from west to east.

4. The track which the centre of the storm takes is called the path of the storm, and the portion of the storm-field on the right of the path is known as the right-hand semicircle, and that on the left as the left-hand semicircle of the storm.

5. In the right-hand semicircle, if the observer be stationary, the wind will always shift to the right, and in the left-hand semicircle to the left. This law holds good in both hemispheres.

6. If a vessel be so situated in a storm that running before the wind the path of the advancing storm will be crossed, this is considered to be the dangerous semicircle. This will always be the right-hand semicircle in the northern hemisphere, and the left-hand in the southern.

7. These storms are most frequent in the northern hemisphere from July to November, and in the southern hemisphere from December to May. In the Bay of Bengal and Arabian Sea they, however, occur most frequently about the time of the change of the monsoon.

8. The area over which revolving storms have been known to extend varies in diameter from 20 miles to some hundreds of miles, and their rate of movement in the West Indies averages about 300 miles a day; in the China Sea, Bay of Bengal, and Arabian Sea about 200 miles a day; and in the Indian Ocean from 0 to 200 miles a day, the more stationary storms occurring at the beginning and end of the hurricane season.

9. The indications of the approach of a revolving storm are (1) an unsteady barometer, or even a cessation in the diurnal range, which is constant in settled weather; (2) a heavy swell not caused by the wind then blowing; (3) an ugly, threatening appearance of the sky.

10. In order to judge what is the best way to act if there is reason to believe a storm is approaching, the seaman requires to know (a) in which direction the centre of the storm is situated, (b) in which semicircle the ship is situated.

11. As these points cannot be determined if a vessel is moving with any speed through the water, the first proceeding should be to "stop" or "heave to," and, as it is always best to assume, at first, that the vessel may be in the dangerous semicircle, she should be hove to on the starboard tack in the northern hemisphere, and on the port tack in the southern.

12. If an observer faces the wind the centre of the storm will be from 12 to 8 points on his right hand in the northern hemisphere, and on his left hand in the southern hemisphere; 12 points when the storm begins; about 10 points when the barometer has fallen three-tenths of an inch, and about 8 points when it has fallen six-tenths of an inch or upwards.

13. If the wind shifts to the right the vessel is in the right-hand semicircle, if to the left in the left-hand semicircle, and, if the wind is steady in direction, but increasing in force, she is in the direct path of the storm.

14. If the seaman has reason to think that his vessel is in the direct path of the storm he should run with the wind on the starboard quarter in the northern, and on the port quarter in the southern, hemisphere until the barometer has ceased falling. If she is in the right-hand semicircle in the northern hemisphere she should remain hove to on the starboard tack, but if in the southern hemisphere run with the wind on the port quarter; if she is in the left-hand semicircle in the northern hemisphere she should run with the wind on the starboard quarter, but if in the southern hemisphere remain hove to on the port tack.

15. Should a vessel not have sufficient room to run when in the least dangerous semicircle, she should heave to on the port tack in the northern, and on the starboard tack in the southern, hemisphere.

16. If in a harbour or at anchor the seaman should be just as careful in watching the shifting of the wind and ascertaining the direction of the centre, as by so doing he will be able to tell on which side of the path of the storm he is situated, and be able to act according to circumstances.

17. Should the centre of a storm pass over a vessel, the wind, after blowing furiously in one direction, ceases for a time, and then blows with equal fury from the opposite direction. This makes a confused pyramidal sea, which is especially dangerous.

IN THIS WORK THE BEARINGS ARE ALL TRUE, IN DEGREES, FROM 0° (NORTH) TO 360°, MEASURED CLOCKWISE.

THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

THE LATITUDES AND LONGITUDES GIVEN IN THE TEXT ARE APPROXIMATE.

THE VARIATION GIVEN IN THE SEVERAL PAGES IS FOR THE YEAR 1916.

THE DISTANCES ARE EXPRESSED IN NAUTICAL MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO THE TENTH PART OF A NAUTICAL MILE.

THE DEPTHS ARE GIVEN AT MEAN LEVEL OF LOW WATER SPRING TIDES, WHERE NOT OTHERWISE STATED.

HEIGHTS ON THE LAND ARE GIVEN ABOVE MEAN LEVEL OF HIGH WATER SPRING TIDES.

WHEN SHADING IS USED TO INDICATE COLOURS OF FLAGS, TIDAL LIGHT SIGNALS, OR BEACONS, IT IS AS FOLLOWS:



Yellow.



Red.



Blue.



Green.



Black.

For all details of the Lights and Fog Signals which are included in this work, seamen should consult the Admiralty List of Lights, Part VI. This List is published early in every year, corrected to the preceding 31st December.

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THE CHINA SEA PILOT, VOL. I.

CHAPTER I.

GENERAL REMARKS.—STRAITS SETTLEMENTS.—FEDERATED MALAY STATES. — NETHERLANDS INDIA, SUMATRA. — TRADE. — CLIMATE.— WINDS AND WEATHER. — CURRENTS. — TIDES.— BUOYAGE.—COAL.—PILOTS.—PASSAGES.

The China Sea Directory, Vol. I., contains a description of Sumatra and its off-lying islands (excepting the east coast, which is in Vol. II) the western coast of the Malay peninsula, Malacca, and Singapore straits.

THE MALAY PENINSULA is a comparatively narrow strip of land lying between the Strait of Malacca on the west and China sea on the east, the Federated Malay States being situated in the central and broadest part of the peninsula. Singapore is situated at the south extreme of the peninsula. Penang and Province Wellesley, on the coast west of Kedah, and Malacca territory between them and Singapore, forming portions of the Straits Settlements. 10

A range of mountains runs throughout almost the entire length of the peninsula, dividing the eastern from the western states; the heights of the various points of the range varies from 3,000 to over 7,000 feet above sea level. The highest point is supposed to be Gunong Karbo, in Perak, 7,160 feet, but a mountain between Perak and Kelantan runs it very close, being 7,120 feet high. The whole of the peninsula, from the mountain tops to the sea shores, is clothed with the most luxuriant tropical forests, consisting of a variety of grand trees, the majority of which are considerably over 100 feet in height. 15 20

The whole of the peninsula is well watered by innumerable streams, having their sources in the hills and combining to form rivers, which flow into the sea at regular intervals, some of which are navigable by vessels of light draught for more than 50 miles.

Flora and fauna.—In the vast forests of the Malay peninsula the accumulation of the decay of vegetable matter during countless ages has enriched the soil to the depths of many feet, and from it spring huge trees, shrubs, bushes, tangle, ferns, mosses, and parasitic growths. Good hardwood timber is obtained, the best kinds being *měraban*, *pěnak*, *rasok*, and *chengal*. Orchids of countless varieties abound. The principal fruit trees are the durian, the mangosteen, the custard-apple, the pomegranate, the jack fruit, the cocoanut, the areca nut, the sugar palm, and the banana. Agila wood, camphor tree, and ebony are found in small quantities. Rubber estates are making considerable progress.

The fauna is varied and profuse, consisting of the Asiatic elephant, the *sěládang*, a large bison, two varieties of the rhinoceros, the honey bear, the sambhur, the speckled deer, the mouse deer, the gibbon, at least twenty kinds of monkeys, the lemur, the Asiatic tiger, the black panther, the leopard, the large wild cat, several jungle cats, the wild boar, the wild dog, the flying squirrel, the flying fox, the python, the cobra, and various snakes, also the alligator and the otter. Amongst the birds are the argus pheasant, the blue partridge, the adjutant bird, and several kinds of herons, cranes, ducks, teal, snipe, wood and other pigeons.

The forests swarm with insects, and the scorpion and centipede are both common.

STRAITS SETTLEMENTS.—The Straits Settlements, a Crown colony, which comprises Singapore (with which is incorporated Labuan), Penang (including Province Wellesley and the Dindings), and Malacca, were transferred from the control of the Indian Government to that of the Secretary of State for the Colonies on April 1st, 1867. The Cocos or Keeling islands were placed under the Straits Settlements in 1886 and Christmas island in 1889. Christmas island was annexed to the Settlement of Singapore in 1900, and the Cocos in 1903.

By a proclamation dated 30th October, 1906, the boundaries of the colony were extended so as to include the Colony of Labuan (Vol. IV.), with effect from January 1st, 1907. Labuan has been incorporated for administrative purposes in the Settlement of Singapore.

The administration of the colony is in the hands of a Governor, residing at Singapore, aided by an Executive Council and a Legislative Council.

The Governor is also High Commissioner of the Federated Malay States and British Agent for British North Borneo and Saráwak. There are municipal bodies in each settlement.

Population.—By the census of 1911 the total population of the colony was 715,529, consisting of Europeans and Americans, Eura-

sians, Chinese, Malays, Tamils and other natives of India, and other nationalities.

Trade.—The principal articles of export are tin, rubber, gums, copra, spices, tapioca and sago, gambier, rattans, hides, preserved pineapples, &c. In the year 1914 the foreign exports were valued at £38,981,369. 5

The chief foreign imports consisted of rice, cotton piece goods, opium, fish, tobacco and cigars, machinery, hardware, coal, sugar, petroleum, &c., which in the same year were valued at £45,660,198.

In 1914 the total number of merchant vessels entered at the ports of the colony, exclusive of native craft, was 9,778. 10

Ports.—The principal ports are Singapore, Penang, Malacca, and Port Swettenham.

Petroleum.—An ordinance, relating to carriage and storage of petroleum, &c., is in force in the Straits Settlements. 15

Money.—The currency of the colony consists of the Straits Settlements dollar, value 2s. 4d., and with the half dollar and the British sovereign, is legal tender for any amount. Subsidiary silver coins are 20, 10, and 5 cent pieces; copper coins are cents, half-cents, and quarter-cents. 20

The unit of currency in the Federated Malay States is the Straits Settlements dollar, the rate of exchange being fixed at 2s. 4d. to the dollar.

Standard time.—The colony of the Straits Settlements and the Federated States in the Malay peninsula have adopted the mean time of the 105th meridian, or 7 hours east of Greenwich mean time. 25

Climate.—The climate of the colony, situated in the neighbourhood of the equator, and exposed to the sea, is both hot and moist. The damp heat is distinctly enervating to European constitutions, and care must be exercised by those who would enjoy good health. See Meteorological tables, Appendix V., pages 478-481. 30

THE FEDERATED MALAY STATES, situated on the mainland of the Malay peninsula, are closely connected with the Straits Settlements, and comprise an area of about 27,506 square miles. The states are Perak, Selángor, Negri Sembilan, and Pahang. The largest town in the states is Kwala Lumpur in Selángor, with about 47,000 inhabitants. 35

An agreement was signed in July, 1895, by which these states were confederated for administrative purposes, and a Resident General appointed, with an official residence at Kwala Lumpur, Selángor. Kedah was transferred from Siam to Great Britain by treaty of March 10th, 1909, the rights of suzerainty and protection as previously agreed on for the other above-mentioned states. 40

General chart 1355.

The following trade values of the four states were recorded in 1913 : Exports, \$148,669,498 ; imports, \$86,409,157.

The principal export is tin ; rubber, pepper, copra, coffee, and tapioca are the principal products.

- 5 The police force is composed of Indians and Malays, officered by Englishmen.

- In 1909 the Malay States of Kelantan, Trengganu, on the east coast of the peninsula (Vol. III.), and Perlis and Kedah, on the west coast, were transferred from Siam to British protection ; these states
10 comprise a total area of about 15,605 square miles.

The revenue of the state in 1911 amounted to £4,177,092.

Produce.—The staple cultivations are similar to those given for the Straits Settlements.

- Population.**—In 1911 the population of the Federated Malay
15 States was 1,036,999 (725,062 males and 311,937 females), the preponderance of males being due to the Chinese and Tamil immigrants.

- The Church of England, the Roman Catholic church, and various denominations of the Methodist church, are all represented in the states. There are numerous vernacular schools, and English schools in
20 the chief centres. Hospital accommodation is efficient in all districts.

- Telegraphs.**—A complete system of telegraphic communication is maintained throughout the Federated Malay States and between the Straits Settlements and other countries. All messages to other countries are transmitted by the Eastern Extension Telegraph Company, whilst local communication is effected by Government telegraph
25 and telephone lines.

Harbours.—The principal ports in the Federated States are Port Weld and Telok Anson in Perak, Port Swettenham in Selangor, Port Dickson in Negri Sembilan, and Pekan in Pahang.

- RAILWAYS.—Communication.**—The Perak State Railway extends from Parit Buntar in Krian to Kwala Prai in Wellesley province, whence are steam ferries to Penang. There is a railway from Malacca to Tampin in the Negri Sembilan. All the railways have a gauge of one metre, and connect with the Federated Malay
30 States system, a continuation of which, through Johor, to Johor Bahru, opposite Woodland station in Old Strait, was opened in 1909. There are electric tramway systems in Singapore and Penang.

There are submarine cables connecting Singapore, Malacca, and Penang, and land lines to all important places.

- SINGAPORE ISLAND**, about 27 miles in length by 14 miles
40 in breadth, containing an area of 217 square miles, is situated at the southern extreme of the Malay peninsula, from which it is separated by a strait about three-quarters of a mile in breadth. There are a number of small islands adjacent to it, which form part of the settle-

General chart 1355.

ment. The seat of Government is the town of Singapore, at the south-west extreme of the island. The island, first occupied in 1819, was for many years administered by officials from India, and became a Crown colony in 1867. (See page 1.) Owing to its geographical position and well-sheltered anchorages, it possesses a trade and importance out of all proportion to its area and productions. 5

The surface of the island is undulating and diversified by hills ranging from 70 to rather less than 400 feet; Bukit Timah, the greatest elevation, being 576 feet high.

Flora and fauna.—When first occupied by the British the whole island was covered with forest and jungle; now, in remote parts, waste places are covered with coarse grass. Palms, ferns, and orchids grow luxuriantly, and Liberian coffee, pineapples, cocoanuts, and aloes are most important objects of cultivation. Almost all kinds of fruits do well. There is a Botanical garden devoted to the introduction of economic plants. 15

Population.—In 1911 the population, inclusive of the military, and Christmas, Keeling, and Labuan islands, was 311,985 (220,890 males and 91,095 females), of which 5,803 were Europeans and Americans, 4,712 Eurasians, and 301,470 Asiatics. 20

Trade.—Singapore is a free port, and no duties are levied upon any articles except petroleum, opium, spirits, wines, and beer consumed in the colony. For the nature of exports and imports, see page 3. The annual value of the fisheries is about 2½ million dollars.

Communication.—Steamships.—The following are the principal steamship companies affording communication with Singapore: Peninsular and Oriental Steam Navigation Company: To London, every week, mail and intermediate boats alternately; mail steamers call at Colombo (where passengers tranship), Aden, Port Said, Marseilles, Gibraltar; the intermediate steamers sometimes call at Marseilles, and usually touch at Malta. Also from Singapore to Chinese and Japanese ports. 25 30

British India Steam Navigation Company: To Penang, Rangoon, and Calcutta, weekly; to Madras and Coromandel coast ports, fortnightly; to Manila and Japanese ports, every six weeks and to Europe, *via* India, every fortnight. 35

Compagnie des Messageries Maritimes: From Singapore every fortnight to Colombo, Aden, and Jibuti, alternately, Port Said, to Marseilles, with London by rail.

The Nippon Yusen Kaisha (Japan Mail Steam Company): From Japan call fortnightly at Singapore and Malacca, *en route* to Bombay and London. 40

The Glen, Shire, and Ben Lines: Call at Singapore and Penang about every three weeks.

The Royal Danish Line: From Copenhagen call monthly. 45

General chart 1355.

East Asiatic Company: A regular service of steamers every 10 days to Bangkok and Chinese ports.

Ocean S.S. Company and China Mutual S.N. Company: Frequent service *via* Singapore, between Europe, China, Japan, and Vancouver.

5 Ellerman Line: Call at Singapore regularly from and to the United Kingdom.

Nederland Royal Mail: Maintain a fortnightly service between Java, Amsterdam, and Singapore.

10 Companie Transatlantica of Barcelona (Spanish mail): Monthly between Manila, Barcelona, and Liverpool.

There is constant communication between Singapore and other ports in the Straits of Malacca, also Java, Sumatra, and Borneo ports, and a regular service to Australian ports.

German and Austrian mail steamers are suspended at present.

15 **Railway.**—A railway from Singapore runs for a distance of about 14 miles across the island to Woodlands opposite Johor, from which a steam ferry crosses the Old Strait or Salat Tebrau, as before mentioned. *See* Railway from Johor, page 4.

20 **Telegraph.**—Two submarine telegraph cables are laid to Penang, and single cables to Malacca, to Saigon, to Labuan, to Landangan, and to Batavia.

NOTE.—Wireless telegraph stations are only shown on general ocean and telegraph charts; and lifeboat and life-saving stations on plans of harbours and anchorages.

25 **Climate.**—The climate is fairly healthy for Europeans, except for the absence of any marked change of temperature throughout the year; there are no diseases or ailments, due to climatic causes, against which special precautions are necessary. The monsoons are little felt on the island, but frequent showers keep it in a perpetual state of verdure. *See* Meteorological tables, Appendix V., pages 478-481.

30 **MALACCA.**—Situated on the western coast of the Malay peninsula, between Singapore and Penang, and about 110 miles north-west of Singapore, Malacca consists of a strip of territory about 42 miles in length, and from 8 to 25 miles in breadth, with an area of 35 659 square miles.

It is one of the oldest European settlements in the East, having been taken possession of by the Portuguese in 1511 and held by them till 1640, when the Dutch drove them out. In 1795 it was captured by the British, and retained by them till 1818, when it was restored to the Dutch; in 1824 it was exchanged for the British settlements in Sumatra, and became a British possession.

Population.—In 1911 the population was 124,081, consisting of 74,883 males and 49,198 females.

45 **Products.**—Tapioca plantations of large extent are very remunerative. Cocoanuts are largely grown along the coast; the soil is very suitable for rubber, and plantations of it are increasing. There are
General chart 1355.

some tin mines of small extent worked by the Chinese. *See Trade*, page 3.

Trade.—In 1914 the foreign exports amounted in value to £1,333,668, and imports to £400,561.

Ports.—Malacca is the principal port. 5

Communication.—Steamships.—Frequent steamship communication by the Straits Steamship Company and by other steamers with Singapore and local ports. For mails, &c., *see* page 5.

Telegraph.—Submarine cables to Penang and Singapore, and a land wire to Port Swettenham and other places. 10

Climate.—The maximum temperature registered in 1904 was 89·5°, and minimum 70·5°, the mean being 79·2°; in the same year the maximum rainfall was 100·3 inches, and mean rainfall 72·2 inches.

PENANG, an island about 14 miles in length, and from 6 to 9 miles in breadth, containing an area of 108 square miles, is the northernmost of the settlements, and situated off the west coast of the Malay peninsula, near the northern entrance to Malacca strait. It was founded in 1786, and officially known as Prince of Wales island, a sum of \$10,000 being paid annually to the British; in 1805 it was made a separate presidency under the East India Company; in 1826 it was incorporated under one government with Singapore and Malacca; and in 1829 it was reduced from the rank of a presidency. *See* page 2. 15 20

The north part of Pulo Penang is mountainous, and through the centre of the island runs a range of hills, declining in height as it approaches the south-west extremity, but two-thirds of the whole surface of Penang is level and of gentle inclination, and, like the hills, is well wooded. West hill, the highest point of the island, is 2,735 feet high, and at a short distance to the eastward is Government hill, 2,551 feet high, on which is a signal flagstaff. The western side of the island is low and wooded. 25 30

Province Wellesley.—On the shore of the mainland, from which Penang is separated by a strait, 1½ miles wide, is Province Wellesley, a strip of territory forming part of the settlement; it averages 8 miles in breadth, and extends about 35 miles in a north and south direction, including 10 miles of territory southward of Krian river, the whole containing an area of 280 square miles. 35

Capital.—The chief town is Georgetown, on Penang island.

Population.—In 1911 the population of Penang, including Wellesley province and the Dindings, was 278,033, consisting of 171,601 males and 106,402 females. 40

Products.—The soil is favourable to the growth of spices; the chief articles of cultivation are sugar, rice, and cocoanuts, and the island produces fine timber, which is well adapted for spars and ship-building; also various fruits. Province Wellesley is in a high state of cultivation when compared with the neighbouring territories; the chief 45

articles cultivated are sugar, tapioca, paddy, and cocoanuts. *See* also Trade, page 3.

In 1914 the foreign exports, inclusive of treasure, were valued at £11,568,179, and foreign imports at £12,452,945.

5 **Fisheries.**—The annual value of the Penang fisheries is estimated at over one million dollars.

Communications.—Steamships.—Most of the large companies' steamers touch at Penang. (*See* Communications, Singapore, page 5.) There is daily communication with Port Weld; once every
10 four days with Padang, Langkat, Perak; weekly with Singapore and China; and frequently with Aceh and Deli. Fortnightly by steamers to Pulo Weh and the west coast of Sumatra.

Railways.—The Province Wellesley section of the Federated Malay States railway connects Prai, in Province Wellesley, with the
15 Perak railway system. *See* page 4.

Telegraphs.—There are two submarine cables to Singapore, and single cables to Colombo, Madras, Pulo Weh, Malacca, and Deli. Land wires to Durian and Lakon, thence to Bangkok.

Climate.—The climate of the high lands of Penang is said to
20 resemble that of Funchal in Madeira; the temperature in the plains ranges between 73° and 94°, and on the mountains from about 65° to 75°. The rainy season is from May to November, but rain falls throughout the year. The annual rainfall on the plains rarely exceeds 65 inches, but on the hills it is generally above 100 inches. *See*
25 Appendix V., pages 478-481.

Excepting in a few places, Penang is considered to be very healthy. It is not subject to epidemics, cholera is unknown, dysentery is infrequent, but in some of the low-lying places ague prevails. Lepers are numerous, and there is a settlement at Pulo Jerajak for them.

30 **The Dindings**, a group of islands, 80 miles to the southward of Penang, contain an area of 270 square miles, two-thirds of which is forest; they include Pulo Pangkor, the largest island, and a strip of territory on the mainland, about 70 miles from Georgetown, and about 22 miles long by 11 miles broad. They are included in the Settle-
35 ments, for administrative purposes, under the Resident Councillor. The only product of any value is timber. Population about 4,000.

PUKET.—The Siamese province or Monthon of Puket, forms the northern portion of the western shore of Malacca strait. It has a coast-
40 line some 250 miles in length between Burma and the northern boundary of Kedah, with the island of Puket in about lat. 8° N., or near the centre of its coast. Its chief town is Puket, or Tongka, on the island of Puket, with a population of about 10,000. The tin industry of this province dwarfs all others. The number of British subjects

General chart 1355.

resident in the Consular district is estimated at between 2,000 and 3,000.

Communication.—Trade.—Trang, Pangnga, Takuopa, and Renong on the mainland are small tin-exporting ports. Trang is the western terminus of the southern line of the State railways, and the centre of an agricultural district in which some planting of both rubber and cocoanuts has recently taken place. Much of its trade is in agricultural produce brought over from the Monthon of Nakon Sritamarat, east side of the Malay peninsula. 5

Little attention has been given to the possibilities of the Monthon of Puket other than tin mining, though there is much land suitable for planting rubber, pepper, &c. There is much valuable timber in the province. 10

Two steamers of about 400 tons each, one belonging to the Straits Steamship Company and the other to the Eastern Shipping Company, run between Penang and Puket weekly, calling at Taimuang during the north-east monsoon period, and the latter company also run a steamer fortnightly to Tavoy, which calls at Puket, Takuapa, and Renong. The Eastern Shipping Company run small steamers from Penang to Trang (three times a fortnight), to Setul and Sungi Opis (about twice a week), and to Krabi, Pangnga, and Tanun (once a fortnight). A small steamer of the Straits Settlements Company visits Pangnga and Krabi once a week from Puket. There is also regular communication with Rangoon. 15 20

All these vessels are under the British flag. A small steamer of about 50 tons, flying the Siamese flag, runs between Setul and Penang about every five days. 25

Exports and imports.—The principal export from the province is tin ore, about two-thirds of which is from Puket island, mainly produced by the two British dredging companies. 30

In the year ending March 31st, 1913, it amounted to over 7,000 tons, valued at £1,051,894; the value of the 1,000 tons of tin was £217,282. Buffaloes and cattle to the value of £23,022 were exported; wood, pepper, pigs come next in value.

The imports were rice, of the value of £178,615, other provisions, iron and steel manufactures, cotton goods, &c. 35

The health of the province is on the whole good. Puket island has been free from epidemic disease in recent years. There was an outbreak of cholera in the Trang district in January, 1913. Puket is connected with Krabi and Pangnga by telephone; there is no telegraphic communication. 40

KEDAH.—The State of Kedah, on the western side of the Malay peninsula, has a coastline about 60 miles long, and an area of 3,800 square miles. Kedah is distinguished from the other Federated

General chart 1355.

States by the great amount of its level ground, which affords considerable facilities for the production of wet grain; the highest mountain is Gunong Jerai or Kedah peak, a mass of granite, 4,109 feet in height. North of Gunong Jerai is an immense plain of gentle elevation, bounded on the east by a chain of hills, 16 to 20 miles inland, but near the coast it is covered with a belt of mangroves from a half to one mile in breadth. The Kedah is the largest river; the Muda, a shallow stream, is the longest, but is only navigable by small vessels, and is joined at 30 miles above its mouth by Baling river.

- 5
10 Sungai Krian forms the boundary between Kedah and Perak, and Kedah river, at the northern part, touches, in the branches, a large district round Alorstar, the capital.

The capital is Alorstar, on the Kedah river, about 60 miles from Penang by sea. The Sultan is assisted in the administration of the country by an Adviser appointed by the British Government. There are 29 Government vernacular schools, seven telegraph offices, and 11 post-offices, and there is an excellent telephone service throughout the state. A good road is being made to Province Wellesley and others throughout the province. Population in 1911 is 245,986, of whom 195,000 were Malays, 34,000 Chinese, 8,000 Siamese, and about 6,000 Indians.

Railways.—Arrangements have been made for the extension of the Federated Malay States railway from Province Wellesley, with an extension to Perlis; its construction was begun in 1913.

- 25 **Produce.**—The principal product is rice, of which 300,000 bushels and 2,000,000 bushels of padi, were sent to Penang in 1911. There are large rubber, cocoanut, and tapioca plantations in South Kedah, and from the mines 756 tons of tin, and 16 tons of wolfram were exported in 1911.

- 30 **Communication.**—About four or five steamers ply daily between Penang and the ports of Kedah.

Perlis, on the north side of Kedah, has an area of about 300 square miles, and a population (1911) of 32,746. Products same as Kedah. Rice, tin, and guano are exported. The Raja is assisted in the Government by an Adviser appointed by the British Government.

- PERAK** (pronounced Perah) is bounded on the north by that portion of the Straits Settlements known as Province Wellesley and by Kedah, Petani, Kelantan, and Trengganu; on the south by Selangor. Pahang, on the eastern side, adjoins all three of the western states on its inland boundary. Perak has a coastline of about 90 miles, and has 900 miles of roads, of which 800 are metalled; the area is approximately about 7,800 square miles, and the greatest length of

General chart 1955.

the state, in a north and south direction, is about 170 miles, and the breadth, in an east and west direction, 100 miles.

Mountains.—Two mountain ranges, trending from north-east to south-west, are thickly covered with jungle, and attain a height of 8,000 feet above high water, near the eastern boundary of the state; the valley of the Perak and Kinta rivers lies between these ranges. 5

Rivers.—The state is well watered by numerous rivers and streams, of which the Perak river is the most important; it runs nearly north and south, then turns sharply to the westward and falls into the Strait of Malacca. It is navigable, for about 40 miles from its mouth, by steam craft of from 300 to 400 tons, and for another 125 miles by cargo boats, but the upper part of the river, being rocky and abounding in rapids, is only suitable for small boats and rafts. 10

The Kinta, Batang Padang, and Plus, the three largest tributaries of the Perak river, are all navigable by cargo boats. 15

Of the other rivers, the Bernam, Dinding, Bruas, Larut, Sapetang, Kurau, and Krian may be mentioned, but the Bernam river is the only one navigable; it is 2 miles wide at its mouth, and is navigable for steamers for a distance of about 100 miles.

Population.—In 1911 the population of the state was 497,057, consisting of 344,238 males and 149,819 females. 20

Products.—The principal product is tin. Coffee, sugar, rubber, and rice are also extensively cultivated.

Ports.—Port Weld is the port of Taiping, the capital; Telok Anson on the Perak river has also considerable trade. 25

Communications.—Steamships.—There is communication by steamers between Port Weld and Penang.

Railways.—See page 4.

Telegraphs.—Telok Anson, on the Perak river, is in telegraphic connection with Penang and other places in the Straits Settlements. 30

Climate.—The climate of the state is hot and moist, but, except at the bases of the mountain ranges, where there is always more or less malaria, is not unhealthy, and is more favourable for Europeans than that of most tropical countries. The Malays and Chinese suffer from febrile attacks, scrofulous affections, and ulcers on the legs. 35

Being protected by the high mountains of Sumatra, on one side, and the range, forming the backbone of the peninsula, on the other, the country is only subject to the usual land and sea breezes, calms and variable winds, interrupted by occasional squalls.

In the low country the temperature seldom rises higher than 86° Fahr. in the shade, while at night it frequently sinks to 65° Fahr.; on the hills being proportionately less. The rainfall is greatest from August to December, but rain falls during every month of the year. 40

SELÁNGOR, on the western coast of the Malay peninsula, is bounded on the north by Perak; on the south by Negri Sembilan; on the east by Pahang and Negri Sembilan; and on the west by the Strait of Malacca; its total area is estimated at 3,200 square miles, its greatest breadth 48 miles, and it has a coastline of about 125 miles.

It was settled in 1718 under a Sultan, who in 1783 was driven out by the Dutch; British political relations with Selángor commenced in 1818, and a British Resident, appointed in 1874, advises the Sultan in the government.

- 10 The state is divided into the following six districts: Kwala Lumpur, the head-quarters of the Central Government offices; Klang, 14 miles from the mouth of the Klang river; Kwala Langat, an agricultural district and residence of the Sultan; Kwala Selángor, with the most important fisheries in the state; Ulu Langat, an inland mining district; and Ulu Selángor, adjoining Perak, a most important mining district. Each district is under the charge of a European District Officer.

Where the state touches the centre range of the peninsula there are several peaks over 5,000 feet and one 6,200 feet in height, and it is drained by four rivers, the Bernam, the Selángor, the Klang, and the Langat.

Population.—In 1911 the total population was 294,035, consisting of 220,939 males and 73,096 females, the preponderance of males being due to the number of Chinese and Tamil immigrants.

- 25 **Products.**—In 1907, 61,552 acres were under cultivation with rubber trees, rubber being the principal cultivated product in the state. Cocoanuts, coffee, pepper, and areca nuts are also grown, but in comparatively small quantities.

- 30 **Trade.**—The principal exports, amounting in value, in 1911, to about £5,534,883, were tin, rubber, coffee, and copra. The principal imports, amounting in value to £3,523,551, were rice, specie, railway material, cotton piece goods, and opium. The only import duties are on opium and spirituous liquors.

- 35 **Chief town.**—Kwala Lumpur is the chief town of the state, and the head-quarters of the Chief Secretary, as well as the Resident of the state. It has numerous important and imposing buildings, is supplied with electric light, has an excellent water supply, and is the head-quarters of the Government railway services.

- 40 **Port.—Shipping.**—Port Swettenham is the port of Selángor as well as the principal port in the Federated Malay States. The trade is included in that of the Straits Settlements, referred to on page 3.

Communications.—Steam vessels.—There are frequent and regular communications, by means of coasting steam vessels, between the Straits Settlements and Selángor.

Railways.—There are about 150 miles of railway in the state. The system connects with Perak at Tanjong Malin on the Bernam river, and passing southward through Kwala Lumpur, crosses the inter-state boundary into Negri Sembilan. A branch line, 27 miles in length, connects Kwala Lumpur, with Port Swettenham, and another, $5\frac{1}{4}$ miles in length, with the Batu caves. A railway connects the system with Johor and Singapore. The depôt and goods sheds at Kwala Lumpur are commodious, and lighted throughout by electric light.

Telegraph.—The telegraph system extends all over the state, and there are 485 miles of wire. A line has been laid from Singapore to connect with the Federated Malay State system, but this land line is liable to damage from elephants. Telephones are worked over 3,917 miles of line, and a telephone exchange is in operation at Kwala Lumpur, Klang, Kajang, Batang, Kwala Selángor, and Port Swettenham.

Roads.—Selángor possesses 763 miles of roads, of which 703 miles are metalled. Kwala Lumpur is connected by roads with the capital towns of Pahang, Negri Sembilan, and Perak; these roads are 120 miles, 43 miles, and 203 miles in length, respectively. The road to Pahang passes over the main range of the peninsula at an altitude of 2,700 feet.

The metalled roads have an excellent surface, and so afford great facilities for the use of motor-cars and motor-cycles, of which there are many, both private and public. Motor-car services connect several of the outlying districts with the railway, being run by both private firms and by the Government.

Climate.—The climate is similar to Perak. The rainfall, which averages in the centre about 100 inches, varies greatly on the coast and mountains; in one year the maximum at Klang was 49 inches, and at Ulu Selángor in the mountains 328 inches.

NEGRI SEMBILAN, or the Nine States, consists of Johol, Ulu Muar, Jempol, Têrachi, Inas, Gunong Pasir, Rembau, Tampin, and Gemencheh, and includes Sungai Ujong and Jelebu; the area of the Confederation is about 2,400 square miles. The coast district extends from the Lingi river (Malacca) on the east, to the Sepang river (Selángor) on the west. Negri Sembilan has 423 miles of roads, of which 406 miles are metalled.

Population.—The total population of the Confederation, in 1911, was 130,199, consisting of 87,651 males and 42,548 females.

General chart 1355.

Trade.—The exports, in 1911, consisting of tin and tin ore, cultivated rubber, copra, gambier, tapioca, pepper, coffee, &c., were valued at £982,584, and imports of rice, opium, tobacco, live animals, cotton, wool, iron ware, specie, and other articles, at £549,380.

- 5 **Ports.**—Arang Arang or Port Dickson, is the chief port of the state.

Communications.—Steamships.—There is regular communication from Arang Arang by steam vessels to Singapore and other ports in the Straits Settlements.

- 10 **Railways.**—Arang Arang is connected by railway with Seremban, a distance of $24\frac{1}{2}$ miles; there is also a line from Seremban to Kajang.

Telegraph.—A submarine telegraph cable connects Malacca with Penang, and with Singapore.

- 15 **Climate.**—The climate along the coast is dry and the air invigorating; the mean temperature for 1901 was 83° Fahr. Inland the climate is considered good; the mean rainfall for 1901 was 91·09 inches, September being the driest month with 2·42 inches, and April the wettest with 17·91 inches.

- 20 In the same year the death rate in the hospitals for the whole state was 6·93 per cent.

- JOHOR**, which comprises Muar Kiri, includes the whole of the southern end of the Malay peninsula from lat. 2° 40' N. to Tanjong Penyusuh, including the small islands which lie off this coast, and is
25 bounded on the south by the Old Strait of Singapore and the Strait of Malacca, on the west by Malacca and Negri Sembilan, and on the north by Pahang. The area of Johor is about 9,000 square miles, and the population in 1911 amounted to 180,412. Its foreign relations are controlled by Great Britain by virtue of a treaty in 1885. A British
30 officer acts as adviser to the Sultan.

The form of government is akin to that of a constitutional monarchy, and in many respects resembles that of the neighbouring colony. Johor Bahru, 15 miles north of Singapore, on the Old Strait of Singapore, is the capital.

- 35 **Mountains.**—The country is, as a whole, less mountainous than any other part of the peninsula; the hills are all detached groups or portions of two interrupted chains—Gunong Ledang or Mount Ophir in Muar (4,186 feet above high water) is probably the highest peak in the state, and the Blumut hills, 60 miles east-south-eastward from
40 Mount Ophir and 3,180 feet high, the principal mountain group.

Rivers.—The three largest rivers are the Muar, the Endau, and the Johor, of which the Muar is the largest; it rises in Negri Sembilan, flowing south-east and then south-west. The Endau, which forms the northern boundary with Pahang, flows from the Segamat hills, and the

Johor, rising in the Blumut hills, opens out into a wide estuary opposite the eastern end of Singapore island.

Minerals.—Iron, the only mineral in which the country is really rich, is found almost everywhere, but is unworked. Important deposits of tin have been found, and considerable tin mining is carried on ; gold is found in some localities, and a mine is worked near Gunong Ledang. 5

Products.—Rubber, cultivated in European, native, and Chinese plantations, is the principal export. Gambier and pepper are cultivated by the Chinese all over the country ; European plantations are chiefly sago, coffee, tea, and cocoa. 10

Trade.—The principal exports are rubber, gambier, pepper, coffee, sago, and the natural products of timber, rattans, damar, &c. Johor Bahru may be considered the chief port of Johor, but almost all the produce is shipped from Singapore, and Bandar Maharani, the Port of Muar. 15

Communications.—Bandan Maharani has steam communication with Singapore on every day except Monday, and a small steamer keeps up communication three times a week between Singapore and Banang, situated 5 miles up the Sungai Batu Pahat. 20

Railways.—A light railway runs from Bandar Maharani, through the Padang district, to Parit Jawa, a distance of 8 miles.

A railway through Johor, *via* Segamat, connects Johor Bahru with the town of Malacca, and the railway system of the Federated Malay States, the journey from Singapore to Kwala Lumpur occupying twelve hours, and that to Malacca nine hours. 25

Climate.—The climate is remarkably healthy, and the introduction of a proper water supply has made epidemics rare. The highest temperature is about 98·5° Fahr., lowest 68·2°, and the average rainfall 97·28 inches. 30

PAHANG is the largest of the states. For description, see China Directory, Vol. III.

NETHERLANDS INDIA.—SUMATRA ISLAND is about 960 miles in length in a north-west and south-east direction, its greatest breadth being about 220 miles, and its area 170,744 square miles ; it is the largest of the islands of the Malay archipelago, except Borneo, and is about three times the size of Java. The equator passes through about the middle of the island. 35

Sumatra was first visited in 1590 by the Portuguese, by the Dutch in 1600, and by the British two years afterwards. The latter continued to establish factories and form settlements in the island during the 17th century. These settlements were retained by the British until 1825, when they were ceded to the Dutch in exchange for Malacca. 40

General chart 1355.

Most of the trading ports are in the hands of the Dutch, who claim the sovereignty of the island.

There are seven important political subdivisions of the country, and the Governor of the whole of the Government stations has his residence at Padang.

Mountains.—A lofty chain of mountains extends throughout its whole length of the island, the ranges being in many parts double and treble, but in general situated much nearer to the western than the eastern coast, the western slopes descending rapidly towards the ocean and the eastern looking out over a vast alluvial tract of unusual uniformity.

This great alluvial plain, generally only a few feet above the level of the sea, is 600 miles in length and from 60 to 110 miles in width, and, with the rare exception of a few patches on the river banks, is usually beyond the reach of the tide, and covered with a stupendous forest of primeval origin. The south-eastern extremity of the island is little better than a forest of mangrove growing out of a morass. The greater part of the island is a sterile or intractable wilderness, and considering its size the country is thinly populated.

Volcanoes.—Gunong Korintji or Mount Indrapura, 12,678 feet, the culminating peak, smokes from time to time; Merapi, 90 miles north-westward from Gunong Korintji, the most active, was in full eruption in 1807, 1822, 1834, 1845, 1863, 1864, and 1872. Mount Talang, 24 miles south of Gunong Korintji, has three craters, one filled with molten sulphur.

Rivers.—The watercourses, owing to the configuration, are comparatively short on the western side, but those of the eastern slope are longer, navigable for small vessels, and, in their lower courses, form considerable deltas.

The middle and lower courses of the larger rivers, as the Musi, the Jambi, the Indragiri, the Kampar, the Siak, the Rokan, the Panei, the Bila, and the Asahan, all flowing eastward, are navigable over considerable distances for vessels of from 6 to 10 feet draught. The Musi and the Jambi are described in Vol. II.

Lakes.—The mountain regions contain numerous lakes, many evidently craters of extinct volcanoes; they are Tao Silatahi, with Tao Muara and Tao Balige, its off-shoots; Manindji, Pinkarah, Korintji, Ran Au, and Lake of the Cross Kotas.

Minerals.—Gold occurs in several regions, and mines have been long worked in Menang Kabau and the interior of Padang; tin, copper, and iron are also worked. Coal seams exist in the Malabub valley, in the Sinamu valley and on both sides of the Ombilin river, and lignite, of good quality, is found in several localities. Arsenic,

General charts 2760, 2761.

saltpetre, alum, naptha, and sulphur may be collected in the volcanic districts, and oil wells are worked at Langkat and other places.

Flora and fauna.—In the northern part of the island the pine tree has advanced almost to the equator, and in the southern part are a variety of species characteristic of the Australian region. As a timber-producing country the island ranks high among the richly-wooded lands of the archipelago. 5

The cocoanut, betel, bamboo, and sugar-cane, and an abundance of tropical fruits, are indigenous.

The principal cultivated plants, apart from sugar-cane and rice, are the cocoanut palm, the areng palm, areca and sago palms, rubber, tobacco, maize, yams, and sweet potatoes. The chief fruit trees are Indian tamarind, pomegranate, guava, papaw, orange, and lemon. 10

There are five species of apes. The flying cat or flying lemur and kalong, "flying fox," are common, and bats are represented by about twenty species; the tiger, bear, and wind dog are found, and the coffee rat is abundant. 15

Elephants are represented by a peculiar species. Rhinoceros are common, and there are two kinds of deer.

Population.—In December, 1905, the population amounted to 4,029,503, of which over 6,000 were Europeans. 20

Products.—Buffaloes are the most important live stock; the breed of horses is small but well made and hardy; sheep also are small.

The staple industry of the country is agriculture, and among the vegetable products the most important are rubber, pepper, and tobacco. 25

Trade.—The chief articles of export are pepper, petroleum, benzine, tobacco, rubber, hides, coffee, nutmegs, rattans, coral, rice, tapioca flour, camphor, gambier, gutta-percha, copra, and dried fish. Almost all the necessaries of life have to be imported, and the imports are chiefly woollen and cotton, haberdashery, tea, provisions, wines, beer, spirits, tin-ware, clothing, rice, metals, hardware, cutlery, matches, motor-cars, cement, drugs, &c. 30

In 1910 there were 116 tobacco plantations, chiefly around Deli, on the east coast, and the production in that year amounted to 19,480,771, considerably less (about one-tenth) than in the two preceding years. 35

Ports.—Olehléh is the principal port on the north coast; Deli on the east coast; Telok Betong (Vol. II.), on the south-east coast; and Padang on the west coast. 40

Railways.—A railway runs from Olehléh through Kota Raja and up the Acheh valley, and is to join the railway that runs from Kwala Langsar, through Edi, and up the Segli valley. The extension of this railway to connect with the Deli system is under consideration. A railway from Belawan passes through Labuan Deli to Medan, and to 45

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Deli Tua, with branches at Medan to Timbang Langkat, to Serdang and to Bedagei; an extension to Aru bay is in progress.

- On the west coast, Emma haven, the port of Padang, is connected with the town by a railway, and from Padang there is a cog-wheel
5. railway to Fort de Kock and Paja Kombo.

Telegraphs.—Olehléh is connected with Pulo Weh and with Deli by submarine cable, and a cable connects Deli and Penang. On the west coast of Sumatra there is a land wire from Singkel to Telok Betong (Vol. II.) with telegraph stations at Tapanuli (where there is
10 a land wire to Deli), Padang, Moko Moko, Palembang, and Telok Betong. Padang is connected with Anjol, near Batavia, by submarine cable.

INTERCOLONIAL SERVICES OF THE NETHERLANDS ROYAL STEAM
PACKET COMPANY.

1. Every fortnight, from Batavia to Padang, Olehléh, Penang, and back; calling, both ways, at Telok Betong, Kroe, Benkulen, Sigli,
15 Semawe, and Langsa; Engano is visited occasionally.

1A. Every fortnight, from Batavia to Padang, and back; calling at Telok Betong and Benkulen on the outward voyage, and at Bintuhan and Benkulen on the return.

2. Every fortnight, from Padang to Olehléh, Penang, and Singapore; calling both ways, at Siboga, Baros, Singkel, Sinabang, Tapat Tuan, Meulaboh, and Chalang; on alternate voyages also at Priaman, Ajer-Bangies, Natal, and Pulo Tello in the Batu group, and Telok-Dalam, Naku islands, Lahewa, and Gunong Sitoli in Pulo Nias.
20

3. Every week, from Batavia to Singapore and back; calling at
25 Tanjong Pandan both ways and Rhio every other voyage.

4. Every fortnight, from Batavia to Semarang and back; calling at Cheribon on the outward voyage, and every fortnight from Batavia to Palembang and Jambi, and back, calling at Muara Saba.

- 4A. Every week, from Batavia to Palembang and back; calling at
30 Tobo Ali and Muntok on the outward voyage; on the return Muntok is called at, and Tobo Ali and Sungi Slan alternately.

- 4B. Twice a month, from Batavia to Singapore and back; calling, both ways, at Tobo Ali, Koba, Pangkal Pinang, Liat, Blinyu, Jibuse, and Muntok. Every fortnight from Batavia to Palembang and back,
35 calling at Mengala.

5. Every fortnight, from Singapore to Belawan, Deli, and back; calling, both ways, at Bengkalis, Paneh, and Asahan. Siak is visited every fourth outward voyage.

6. Twice a month, from Batavia to Pontianak, Kartiasa, and back;
40 calling at Tanjong Pandan and Singkawang, Pemanghat, on alternate voyages.

7. Every week, from Batavia to Semarang and Surabaya, and back. Cheribon, Tegal, and Pekalongan are touched at once a fortnight in both directions.

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8. Every week, from Singapore to Surabaya, Banjarmasin, Samarinda, and back; calling at Stagen, Kota Baru, and Bawean.

9. Every fortnight, from Singapore to Batavia, Semarang, Surabaya, Makassar, Menado, Gorontalo, and ports in the Gulf of Tomini. On this route ports on the west and north coasts of Celebes are visited, 5 also Siau island and Ternate.

10. Every fortnight, from Makassar to the Gulf of Boni and back; calling at Bonthain, Salayar, Sinjai, Bajoa, Palima, Palopo, Malili. Kolaka is visited every other voyage.

10A. Monthly, from Makassar to Luwuk and Gorontalo and back; 10 calling at Buton, Muna, Kandari, Salabangka, Bunko, Kolono, Bangai Archipelago, and Bunta.

11. Every month, from Surabaya to Damma; calling at Anpenan, Sumbawa, Bima, Waingapu, Ende, Savu, Rotti, Koepang, Atapop, Dilhi, Ilwaki, Kissa, and Letti. 15

12. Every four weeks, from Singapore to Batavia, Surabaya, Buleleng, Makassar, and Amboina, and thence to the Banda and Tenimber islands.

From Batavia, once a month by the Java-Australia line to eastern ports of Australia and Melbourne and back; calling at Semarang, 20 Surabaya, Port Moresby, and Thursday island. Dobo is called at occasionally.

Language.—The Malay language is generally understood, and is everywhere used to communicate between Europeans and natives.

Coinage.—Dutch currency is legal tender over all the Nether- 25 lands possessions, the standard coin being the silver guilder equal to 1s. 8d. English. The coins in circulation are as follows: Gold: 10-guilder piece. Silver: 1 dollar piece; 1, $\frac{1}{2}$, and $\frac{1}{4}$ -guilder pieces; 10 to 5 cent pieces. Copper: 2 $\frac{1}{2}$, 1, and $\frac{1}{2}$ cent pieces.

The weights and measures are generally the metric system, as in 30 the Netherlands.

Climate.—The climate, more particularly on the low-lying flats forming the east coast of Sumatra, is unhealthy, but the heat is not so great as might be supposed from its being under the equator. The changes in temperature are slight, and there are no dry and wet 35 seasons such as are usual in tropical climates. The principal scourge is malarial fever, which never ceases to work havoc among Europeans and natives alike; the attacks are sudden, lasting about a week, and sometimes fatal. Dysentery is also prevalent. Cholera is always more or less endemic, at times assuming an epidemic form, and carrying 40 off large numbers of natives.

It is necessary, therefore, to use every precaution to preserve the health of the crew should any stay be made on the coast. The bays and river mouths are notorious for the fevers which they produce. Land- 45 ing or sleeping on shore, or on deck at night except under awnings, should be avoided. The water from ponds or wells near the shore is

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very bad, and running water should be procured, if possible, and invariably boiled for drinking.

The interior of the island is comparatively cool and pleasant.

5 The climate of the north coast of Sumatra (Acheh district) is damp and also unhealthy. The temperature ranges from 77° to 95° , and is subject to great and sudden changes, which vary in different localities. On the north and north-west coast the months of March and April are very hot; on the east coast the whole period of the south-west monsoon is the same.

10 The climate is not everywhere equally unhealthy; for instance, it is noteworthy that during epidemics the mortality is low at Olehléh, as compared with the neighbouring Kota Raja, while there is comparatively little malaria in Olehléh. The extremely damp months of the latter half of the year are most favourable to the development of
15 malaria and beri-beri (an acute disease producing great muscular debility and painful rigidity of the limbs, &c.), whereas the months of January and February are generally healthier.

Rigas, on the west coast, has the reputation of being one of the most unhealthy ports; Benkulen, on the same coast, is but little better.
20 Padang, on this coast, is one of the least unhealthy; here in the highlands the temperature is seldom above 70° to 80° in the middle of the day.

Temperature.—The temperature in Sumatra rises to two maxima during the course of the year; the first occurs in April and May
25 and the second in September and October, amounting to about 81° Fahr. After October the temperature decreases slowly and regularly, the minimum known reading being 78° to 79° in January. In July and August the thermometer is lowest. The mean yearly temperature of the whole of the island is about 80° , or half a degree higher than in
30 Java, and agrees with its situation on the equator. The maximum temperatures do not occur simultaneously over the whole island. At Lahat, near Benkulen, the maximum, 81° , occurs in April; at Siak in May; at Padang in September; and at Palembang in October.

In the high lands of Padang the difference (according to height)
35 amounts to about 20° at a height of 5,000 feet.

Earthquakes occur on the north and west coasts of Acheh, but they are seldom severe; they are felt at sea at times.

Swell.—At the north and north-east portion of Sumatra, during the north-east monsoon, there is generally a swell on the coast, which
40 gives rise to a considerable sea in the afternoon if accompanied by a stiff sea breeze. Both subside quickly, so that the water is generally smooth at night and in the forenoon. At times the monsoon blows strongly for some days, at which times communication with the shore

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is impracticable. December and January are the worst months. The south-west monsoon is the best for landing on this portion of Sumatra.

At Padang the daily temperatures are about 75° at 6 a.m., $81\frac{1}{2}^{\circ}$ at 9 a.m., 84° at 3 p.m., and 77° at 10 p.m. It will thus be seen that the daily temperature range is, as in all tropical countries, not great. The mean yearly difference between day and night temperatures is 8° . 5

At the north-west end of Sumatra, between Acheh head and Pedro point, the south-west monsoon at times throws a high sea on to the coast; a squall sometimes comes from the north-west, rendering it a lee shore, and the water will break in a depth of about 3 fathoms. 10

On the west coast there is nearly always a swell from north-west or south-west. During the south-west monsoon the swell often comes from both directions at the same time, causing a confused sea and breakers on the coast. May, June, and July are the worst months. 15

Landing.—During the north-east monsoon good anchorage and smooth water may nearly always be found near the shore. This monsoon is the favourable one for trade and navigation, but native boats should be used for landing or embarking cargo. 20

WINDS AND WEATHER. — Malacca strait. — Although Malacca strait is within the limits of the north-east and south-west monsoons of the Indian ocean, yet, on account of the high land on either side of the strait, the winds are variable, but land and sea breezes are regular on both coasts. In the offing, the monsoons are only regular when they are at their height in the adjacent seas; even then, however, the wind is moderate in the strait, and only lasts during a part of the day. The monsoons become more regular near Singapore. 25

South-west monsoon.—Between Acheh head and Junkseylon or Salang island the south-west monsoon commences in the latter part of April or the early part of May, and ceases in October; in November there are calms and variables, and westerly winds frequently prevail. 30

The south-west monsoon seldom blows far into the strait. In the middle of the strait during this season, variable winds, chiefly those from S.E. and S.W., prevail with long calms. On the Sumatra side light winds and calms prevail, and heavy squalls from the land are experienced during the night. On the Malayan side there are fewer calms, and seldom any squalls; variable winds or land and sea breezes are experienced. 35

During the south-west monsoon, the weather is generally cloudy and stormy, especially when the monsoon is at its height. 40

Sumatras, or squalls from the south-west, are more common during the south-west monsoon than in the north-east monsoon. They generally blow during the first part of the night, are sometimes sudden and severe, and accompanied by thunder, lightning, and rain; they are more frequently met with on the north coast of Sumatra, and on the 45

See Wind charts 2931-2934.

Malay coast between Parcelar hill and Karimun islands. Here they often blow for six or eight hours at a time as a strong or moderate gale. Their characteristic is that of an arch squall.

North-westers are not so frequently felt as the Sumatras; they are most common during the south-west monsoon, and occur in the north-western part of the strait between Aceh head and Aroa islands, but sometimes blow through as far as Singapore strait. These winds are sometimes severe at their commencement, but their strength soon abates. They are generally preceded by a black cloud arch, which rises rapidly from the horizon towards the zenith, often allowing not more than sufficient time to reduce sail after its first appearance. They are sometimes accompanied by lightning, thunder, and heavy rain.

The north-east monsoon prevails in the western entrance of Malacca strait from November to April, which is the fair season, the weather being then more settled; there are seldom any hard squalls, and there is less thunder, lightning, and much less rain than in the other season.

In November the winds are variable, frequently from North-west and West (extending from as far westward as Ceylon), although occasionally the north-east winds set in in November. From this period to March the north-east monsoon is strongest, but at times north-west and west winds, of one or two days' duration, have been experienced in every month when the north-east monsoon should prevail. Late in March the north-east and northerly winds become light and variable, with strong land breezes at night. On the Malayan side these breezes commence between 8 and 10 p.m., and last four or five hours, sometimes all night; this is more generally the case between Mount Formosa and Cape Rachado. There is less calm on the Malayan than on the Sumatra side of the strait.

Malay peninsula.—Singapore.—During January, February, and March, the north-east monsoon period, the winds from N.E. to N.W. predominate, with frequent calms. April and May, the commencement of the south-west monsoon, the directions are principally from N.W. to west. In June, July, and August, from S.W., and from September to November variables (west to N.N.W.). The north-east monsoon sets in in December. See Meteorological tables, Appendix V., pages 478-481.

Malacca.—N.N.E. and W.S.W. winds are prevalent during the first six months of the year. In the remaining months the winds are principally south, S.E., and N.W.

Province Wellesley.—North-west winds prevail during January and February, and south-west winds from March to May, and in the other months, S.S.W., N.N.E., and N.E.

Penang.—The prevailing winds from January to June are N.E.

See Wind charts 2931-2934.

and N.W. During the latter half of the year, north-west winds predominate.

Salang island.—At Junkseylon or Salang island, in the northern entrance to Malacca strait, the monsoons are more regular than at the Straits Settlements. The north-east monsoon sets in in December, with strong gales from N.E. to N.W., accompanied by lightning, and continues until March; this is the dry monsoon, and much sickness prevails on shore between February and April. In March, the monsoon is weak, with occasional squalls. April is the change to winds from west to north with heavy squalls.

The burst of the south-west monsoon occurs early in May; it has fairly set in by June, and heavy squalls and rain are frequent. It continues, with many days rain and as many days fine, until October. November is variable, with heavy squalls from all quarters. The maximum daily rain per month (about 20) occur in August; in January and the early part of February there is little or no rain.

SUMATRA, north coast.—The south-west monsoon prevails from about April to November, and the north-east monsoon from about November to April, as previously stated for Malacca strait. During the south-west monsoon, the wind frequently holds both day and night between Acheh head and Pedir point, whilst farther eastward it is not so permanent.

In the strength of the north-east monsoon, the wind blows from east to N.E. from about 10 a.m. to 4 p.m., strengthening near the close; it then begins to drop, and is usually calm about sundown, and there is a land breeze during the night. In April, S.W. and west winds begin, and the south-west monsoon is established in May. For Sumatras, see page 21. Waterspouts are seen off this coast at times.

Sumatra, east coast.—The coast between Jambu Ayer and Deli is not so much under the influence of the prevailing monsoon, as the direction of wind is completely altered by the conformation of the land, the broad plains, at the foot of the high mountains, being most favourable to the regularity of land and sea breezes, and the wind is generally N.E. by day and S.W. by night all the year round on the coast. During the north-east monsoon north-east winds are more prevalent in January, February, and March. North-west winds sometimes occur at night in February and March, but they are infrequent compared with the winds from west and south-west.

Throughout the year, north-west and south-west winds are observed at uncertain periods for several days at a time and generally accompanied by fine weather. Sumatras are more frequent here than on the north coast.

Sumatra, west coast.—The influence of the south-west and north-east monsoons are felt on the west coast of Sumatra as far south as about lat. 2° N., southward of which the monsoons of the

See Wind charts 2931-2934.

Indian ocean are experienced. But from Acheh head to lat. 4° N. the winds are quite different from those between 4° N. and 2° N.

Between Acheh head and lat. 4° N., the south-west monsoon prevails from May or October, inclusive, and the north-east monsoon
5 from December to March. During the height of the south-west monsoon, the sea breeze prevails at times during the night, but generally speaking the land winds are clearly perceptible by the deflection of the wind to S.E. or north during the night. Squalls are frequent during the monsoon, and there is often a considerable sea along this
10 coast. It is somewhat hazy at times.

The north-east monsoon period is from December to March, and it is less strongly marked. When the monsoon has fairly set in, there is usually a gentle southerly breeze in the morning, followed by a calm, and in the afternoon a light sea breeze. After sunset comes the
15 land wind, which prevails all night.

Between lat. 4° N. and lat. 2° N. is the region of calms and light variable winds. From the Batavian meteorological records, calms occur more frequently here than in other portions of the Netherlands India possessions; squalls occur occasionally.

The influence of the monsoons only appears in a westerly tendency of the day wind from March to November, and an easterly tendency from November to March; at night, except in January and February, there is always a northerly tendency in the wind.

In April, S.W. and N.W. winds are most prevalent both night and
25 day. From May the N.W. winds become more prominent. During the following months they increase and reach their maximum in October; at times these winds cause a considerable sea.

August is marked by a frequency of north-east winds. At night, the winds from May to November are from N.W. to N.E.

From November to January, the wind is very variable in the day-time; at night it is generally from N.E. to east. In February, the wind is often from S.E. to east, but there is also much westerly wind. At night, the winds are divided between S.W. and E.S.E., or S.E. winds. March is marked by a westerly wind by day, and N.E. or
35 east winds at night.

Southward of the equator, in the offing, the winds gradually merge into those prevailing in Sunda strait and the Java sea.

At Padang (lat. 1° S.), when the south-east monsoon is well established in the Indian ocean, then it is noticeable in Padang; these
40 winds, however, seldom prevail longer than a couple of hours, and are mostly light.

The prevalent winds are N.W. and west; in the months of February, March, and April, usually accompanied by fair weather; in May, June, and July, alternating from N.W. to S.W., with thunder
45 and rain squalls.

In the months of August, up to and including December, the N.W.

See Wind charts 2931-2934.

and west winds are generally well established, accompanied by hard squalls, outbursts from the north-west, a high sea from north-west to south-west, and much rain. The squalls usually come without warning, with violent gusts of wind. Day after day during the months mentioned the wind will sometimes blow stiffly from N.W. and west; 5 in the month of January the wind is variable, but it is then mostly light and calm. There is usually a land wind at night.

Cyclones are not met with *near* the coasts treated of in this volume.

In November, 1871, at 100 miles south-west of the Pagi islands, a 10 cyclone was encountered. In July, 1871, a cyclone was encountered 300 miles westward of Siberut island, which travelled from thence in a westerly direction. Also a report was received of a cyclone 150 miles south-west on Engano island, in April, 1881.

WEATHER SIGNALS.*—Information on the weather in the 15 several divisions of the Bay of Bengal are exhibited at Sabang, Pulo Weh. From 1st April to 14th January, vessels passing Sabang can, on request, be informed as to the weather conditions in the Bay of Bengal, both by flags and by wireless signals.

The request for receipt of the weather signal is made by hoisting 20 flags ZK, or by these letters signalled by wireless.

The giving of the weather information by means of a flag signal is free, and the wireless signal through Lloyd's agents at Sabang will be charged against the shipowners.

The weather conditions are reported by the letters B to W, inclusive, 25 by flag signals of the International signal book. The meaning of the letters is given in the table on next page.

The signal is usually made with four flags (letters), giving the weather conditions in four different parts of the gulf, as follows:—

Division I. is the eastern half of the bay and for about 200 miles 30 north and south of Rangoon.

Division II. is the head of the bay from Calcutta to about lat. 19° N.

Division III. is the western half of the bay, southward of about lat. 19° N. to about Madras.

Division IV. is the whole of the bay southward of the parallel of 35 Madras.

The top flag, or the first signal letter, refers to the weather conditions in Division I.; the second flag, or the second letter, to Division II., &c.

The signals show the weather conditions at 8 a.m. of the same day. 40

These weather signals will be received at Sabang on working days between 12 and 1 p.m., and on Sundays to 2-30 p.m.

To show that the signal has reference to the weather conditions at 8 a.m. on the previous day, the flag A of the International signal book

* NOTE.—These signals are under revision. Application may be made to the Harbour authorities for the new signals.

See Wind charts 2931-2934.

is flown under the four flags of the signal; with the wireless, the letter A is signalled after the four letters. When the weather conditions at hours other than 8 a.m. are known, use is made of the flag or letter Z, according to the following rules:—

- 5 If the signal gives the weather conditions as at noon (instead of 8 a.m.), then the flag Z is flown over the four flags of the signal, with wireless the letter Z is signalled before the four other letters.

- If the signal gives the weather conditions as at 4 p.m., then flag Z is between the top two flags of the signal, and with wireless the letter Z is signalled after the first letter of the weather signal.
- 10

If the signal gives the weather conditions at 8 p.m., then flag Z is between the second and third flags of the signal, and with wireless the letter Z is signalled after the second letter of the weather signal.

- 15 If the signal gives the weather conditions at midnight, then flag Z is between the third and fourth flags of the signal, and with wireless the letter Z is signalled after the third letter of the weather signal.

If the signal gives the weather conditions at 4 a.m., then flag Z is under the four flags of the signal, and with wireless, the letter Z is signalled after the four letters of the weather signal.

TABLE GIVING THE MEANING OF THE LETTERS.

(1) Flag or Letter	(2) Weather Conditions	(3) Winds	(4) State of the Sea
B	Usual weather for the season -	Little or moderate winds, direction as usual in the season.	Calm or light sea.
C		Moderate to strong winds, direction as usual in the season.	Probably light to moderate sea.
D		Strong winds, direction as usual in the season.	Probably moderate to rough sea
F		Little or moderate winds from unusual direction.	Calm or light sea.
G		Moderate to strong winds from unusual direction.	Probably light to moderate sea.
H	Doubtful weather - - -	Strong winds from unusual direction.	Probably moderate to rough sea
J		Light or moderate winds which evidently make part of a cyclone.	Calm or light sea.
K		Moderate to strong winds which evidently make part of a cyclone.	Probably light to moderate sea.
L	Doubtful and possibly squally weather.	Strong winds which evidently make part of a cyclone.	Probably moderate to rough sea
M	Changeable and unreliable weather.	Light or moderate winds from unusual direction.	Calm or light sea.
N		Moderate to strong winds from unusual direction.	Probably light to moderate sea.
P	Changeable, unreliable, and probably squally weather.	Strong winds from unusual direction.	Probably moderate to rough sea
Q	Changeable and unreliable weather.	Light or moderate winds evidently making part of a cyclone.	Calm or light sea.
R		Moderate to strong winds evidently making part of a cyclone.	Probably light to moderate sea.
S	Changeable, unreliable, and probably squally weather.	Strong winds evidently making part of a cyclone.	Probably moderate to rough sea.
T	Changeable and unreliable weather, showing that a cyclone is in the portion of the gulf referred to.	Moderate to strong winds - -	
V	Condition shows a small storm, for the moment of little force in the part of the gulf referred to.	Strong winds - - -	
W	Condition shows that a cyclone has formed in the part of the gulf referred to and is beginning to move from its place of origin.	Strong winds - - -	

See Wind charts 2931-2934.

RAINFALL.—Straits Settlements.—In the Straits Settlements rain falls throughout the year. Observations taken during the 10 years 1891-1900, show that the average number of rainy days in the year, at Singapore, the east extreme of the Straits Settlements, is 178, and the average annual rainfall is 95·8 inches. The average monthly rainfall ranges from 5·65 inches to 11·03 inches; December and January have the heaviest, and February and June the lightest average fall. 5

Observations taken at Penang, the west extreme of the Straits Settlements, during a period of nine years, ending 1890, show the average annual rainfall as 111·8 inches. The average monthly rainfall ranges from 2·8 inches to 19 inches. September and October have the heaviest, and February has the lightest fall. 10

See Meteorological tables, Appendix V., pages 478-481.

Sumatra.—Rain occurs in every month of the year in Sumatra. The period of the greater or less rainfall on the northern half of the island does not correspond with the periods of the monsoons; there is, however, a certain regularity in the increase and decrease of the proportion of wet days in the course of the year. 15

The greatest rainfall on the north coast of Aceh, and the off-lying islands, usually occurs in the months of October and November, the months preceding the change to the north-east monsoon, and the least rainfall in February and March, the months preceding the change to the south-west monsoon. The rainfall on the off-lying islands is about double that on the north coast. 20 25

On the east coast of Aceh, where the monsoons are a little later, the rainfall is heaviest in November and December.

There is no more connection between the rainfall and the prevailing monsoon on the west coast of Aceh than on the north and east coasts; moreover, the rainfall does not at all depend on the time of the year there. In general there is not much difference in the average rainfall in different months. All that can be stated is, that on the northern portion between Aceh head, and about lat. 4° N., the rainfall is less (per month) during the first four months than during the rest of the year, and that February may be called a dry month. 30 35

Between about lat. 2° N. and Sunda strait, the heaviest rains occur from October to December, or about the same as farther north, but the dry month is July.

The rainfall on the west coast of Sumatra differs with the prevailing monsoon. During the north-east monsoon it is generally dry during the day, the rain falling during the early hours of the night, and vessels are mostly outside its limits if at a considerable distance from the shore. There is no actually dry season. 40

During the south-west monsoon, especially from September to November, inclusive, the sky is overcast both day and night, and the weather squally. The rain is violent sometimes for several consecutive days.

- 5 The following table gives the months of maximum and minimum rainfall:—

Place.	Lat. Approx.	Months in which Maximum Rainfall occurred. Average Number of Days per Month.	Months in which Minimum Rainfall occurred. Average Number of Days per Month.	Total Fall in Inches. No. of Days.
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Sumatra, North and East Coasts.

Oehléh	5½ N.	Nov.—Dec. 15 15	Mar. 8	66* 135
Edi	5 N.	Oct.—Feb. 14 19	Feb.—Apl. 6 7	77 128
Seruwai	4½ N.	Aug.—Jan. 15 11	Feb.—Mar. 7 6	83 150
Medan	4 N.	Aug.—Dec. 15 18	Feb.—Mar. 7 9	82 158
Bengkalis	1½ N.	Apl.—May—Sept.—Dec. 17 14 16 20	Feb. 9	104 173

Sumatra, West Coast.

Singkel	2¼ N.	Oct.—Nov. 20 20	Jan.—Feb.—June—July. 15 12 13 15	183 195
Siboga	1½ N.	Oct.—Dec. 22 23	June—July—Aug. 12 14 16	186 211
Gunong Sitoli (Nias island).	1¼ N.	Oct.—Nov. 22	Feb. 13	128 213
Ayer Bangies.....	0¼ N.	Oct.—Dec., Apl. 17 16	Feb.—June 9 10	122 164
Padang	1 S.	Oct.—Nov.—Dec.—Apl. 17 18 16	Feb.—June. 9 10	102 187
Benkulen	4 S.	Oct.—Dec. 18 20	July 11	132 181

* On the islands off the north coast the fall is about double that at Olehléh.

- 10 **CURRENTS.—Malacca strait.**—Westward of the islands northward of the Acheh coast, there is a current setting in a westerly direction, often attaining a rate of from 1½ to 2 knots an hour, and inclining northward or southward of west by the action of the prevailing monsoon. Between these islands and the Nicobars, during the strength even of the south-west monsoon, there is frequently a current setting in the teeth of the monsoon at the rate of 2 knots an hour.

- 15 At the same period, there is said to be a strong current between Pulo Weh and lat. 6° 30' N., setting eastward as far as the meridian of Jambu Ayer; this current is said to continue all the year round, but with less strength during the north-east monsoon. It is to be

See Current charts 2640, 2939-2950.

regarded as a counter current with reference to the westerly current along the Pedir coast from Malacca strait.

Through Malacca strait there is a constant north-westerly set, but near and southward of the Aroa islands, where the strait is considerably narrowed, it is only felt by its action on the tidal streams, decreasing the velocity of the flood stream and almost overcoming it during neaps, and increasing that of the ebb to the same extent. 5

In the north-west portion, the same effect is produced near the shore on the tidal streams, but out in the middle of the strait it is fairly constant and strongest during the north-east monsoon; it finally makes its way seaward along the Pedir coast and affects the tidal streams there, as above mentioned. The tidal action is not appreciable beyond the distance of about 8 miles off the Pedir coast and about 40 miles off the east coast of Acheh, Langksa, &c. 10

Sumatra, west coast.—The current on the west coast of Sumatra is mainly influenced by the prevailing wind, but occasionally it has been found to run against the wind. Generally the currents running south-eastward are more frequent and stronger than those in the opposite direction, especially in October, November, and December. They are usually weak, and have never been found to exceed 2 knots an hour, and seldom exceed one knot. Within 4 miles of the land there are weak tidal streams, the flood running north-westward and the ebb south-eastward. 15 20

To the northward of the equator, when the current is setting to the southward betwixt the coast and the islands, it is frequently at the same time running to the northward in the open sea, far outside of them. 25

To the southward of the equator, when at times the southerly winds blow with considerable strength from June to October, a drain of current is impelled to the northward. Observations are wanted in this portion. 30

TIDES.—Throughout the Eastern seas the rise and fall of the tide is largely affected by diurnal inequality.

At Singapore and its neighbourhood the general feature of the tides consists of one high and one low water, succeeded by a second high and low water of considerably diminished range, the difference between the heights of this inferior high and low water being reduced sometimes to a few inches only; but the difference between two successive low waters is generally greater than the difference between two successive high waters. At certain of the moon's quadratures and in times of large lunar declination, this inferior tide may disappear altogether. At these times there will be only one high and one low water during the day. Special tide tables for Singapore are published as well as in the Admiralty tide tables. 35 40

See Current charts 2640, 2939-2950.

Sumatra.—On the north and north-east coasts of Sumatra there is high and low water twice during the 24 hours, and the highest tides occur 2 days after full and new moon, with high water at Sabang bay at Xh., with a rise of 5 feet, and at Olehléh at XIh., with a rise of 2 feet, and at Segli at same time, with a rise of 4 feet. Neaps occur the same time after quadrature, with high water at IVh. at Sabang bay and at one hour later at Olehléh and Segli, with a rise of one foot at Sabang and half a foot at Olehléh and Segli.

The highest levels occur at springs at Olehléh in the latter part of June and December; at Sabang bay and Segli in the latter part of May and November, at mid-day and evening.

The lowest levels occur at Olehléh in the latter half of March and September, and at Sabang bay and Segli in the latter half of February and August, morning and afternoon. These water levels may rise or fall from a half to one foot above or below normal.

Tidal streams.—The streams are not felt far off the coast, not more than 8 miles. The flood sets eastward on the north coast of Sumatra, and the ebb westward, rarely exceeding 2 knots at springs; at neaps they are sometimes imperceptible, except at the points or over banks and in narrow channels.

The streams are also affected by the constant current out of Malacca strait, which takes a westerly direction along the north coast, through Malacca passage, and out through Bengal passage, so that for the greater part of the year the ebb stream is longer and stronger than the flood stream. Also the prevailing winds, as a result of which, when the water is rising or falling during the north-easterly monsoon, there may be no easterly set for a day or more, conversely, the flood or easterly stream runs longer and stronger during the south-west monsoon.

On the east coast of Sumatra the tides are usually semi-diurnal, with a spring rise of 8 feet at Bengkalis, and 12 feet in Selat Rupert.

On the west coast of Sumatra there is but little rise and fall, and what there is does not seem to follow any known laws.

See the body of the work.

UNIFORM SYSTEM OF BUOYAGE. — Straits Settlements.—There is no uniform system of buoyage in the ports of the Straits Settlements.

Netherlands India.—The following is the uniform system of buoyage in the Netherlands India:—

The term starboard hand means that side which would be on the right hand going with the main stream of flood, or in entering a harbour, river, or estuary, from seaward; the term port hand means the left-hand side, under the same circumstances.

See Current charts 2640, 2939-2950.

Conical buoys are starboard-hand buoys as thus defined, and are painted red.

Can (truncated) buoys are port-hand buoys as thus defined, and are painted black.

Spherical buoys mark the ends of middle grounds, or the separation of two channels, and are painted black and red in horizontal stripes, except when they lie between buoys of the same shape and colour, they are then painted conformably to these. Spherical buoys are always surmounted by topmarks, other buoys only in special cases.

Direction buoys, lying outside and marking the approach to seaward channels, are of a special shape, and are painted red and black in vertical stripes.

Wrecks are marked by conical or can buoys, painted green, according as the wreck lies on the starboard or port side of the fairway. Should the wreck be in mid-channel, it will be marked by a can buoy on one side, and a conical buoy on the other side, which buoys are to be treated as port or starboard-hand buoys according to shape.

Topmarks are as follows:—

A square marks the outer or seaward end of a bank.

A cone marks the inner end of a bank.

A ball marks the starboard side of the fairway.

A truncated cone marks the port side of the fairway.

A cross is used as a special mark, and surmounting a spherical buoy indicates that the buoy may be passed on either side.

The ball and truncated cone are also used as topmarks for beacons.

The topmarks are of the same colour as the buoys or beacons on which they are placed.

The buoys of sea channels are numbered consecutively (beginning from seaward), and marked by the first letter of the name of the channel. The numbers and letters are white.

Until the uniform system of buoyage is completed vessels must guard against risk by following the colour of the buoys, white and red on the starboard hand, and black on the port hand, and disregard the shape.

At some places small buoys, wood beacons, projecting marks, &c., are found, the presence of which must not be reckoned on. These do not appear in the buoyage scheme.

Light-vessels.—The Netherlands light-vessels show a riding light from the fore stay, at a height of 6 feet above the rail, in addition to the distinguishing light.

CAUTION.—All floating marks, such as light-vessels, buoys, and floating beacons, being liable to break away, or to be out of position,

too much dependence should not be placed on any of those mentioned in this work.

Pilot vessels.—Lights.—Pilot vessels, when engaged on their stations on pilotage duty, shall not show the lights required for other vessels, but shall carry a *white* light at the masthead, visible all round the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed 15 minutes.

On the near approach of or to other vessels they shall have their side lights lighted, ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the *green* light shall not be shown on the port side, nor the *red* light on the starboard side.

A pilot vessel, of such a class as to be obliged to go alongside a vessel to put a pilot on board, may show the *white* light instead of carrying it at the masthead, and may, instead of the coloured lights above mentioned, have at hand, ready for use, a lantern with a *green* glass on the one side and a *red* glass on the other, to be used as prescribed above.

A steam pilot vessel, exclusively employed for the service of pilots licensed or certified by any pilotage authority or the committee of any pilotage district, when engaged on her station on pilotage duty, and not at anchor, shall, in addition to the lights required for all pilot boats, carry, at a distance of 8 feet below her *white* masthead light a *red* light, visible all round the horizon, and of such a character as to be visible on a dark night with a clear atmosphere from a distance of at least 2 miles, and also the coloured side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and at anchor she shall carry, in addition to the lights required for all pilot boats, the *red* light above mentioned, but not the coloured side lights.

Pilot vessels when not engaged on their station on pilotage duty shall carry lights similar to those of other vessels of their tonnage.

Fishing vessels.—Fishing vessels and fishing boats, when under way, and not required by this article to carry or show the lights hereinafter specified, shall carry or show the lights prescribed for vessels of their tonnage under way.

(a) Open boats, by which is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night with outlying tackle extending not more than 150 feet horizontally from the boat into the seaway, shall carry one all-round *white* light.

Open boats, when fishing at night, with outlying tackle extending more than 150 feet horizontally from the boat into the seaway, shall carry one all-round *white* light, and, in addition, on approaching or being approached by other vessels, shall show a second *white* light at

least 3 feet below the first light, and at a horizontal distance of at least 5 feet away from it in the direction in which the outlying tackle is attached.

Vessels and boats, except open boats as defined in subdivision (a), when fishing with drift-nets, shall, so long as the nets are wholly or partly in the water, carry two *white* lights where they can best be seen. 5

Such lights shall be placed so that the vertical distance between them shall be not less than 6 feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be in the direction of the nets, and goth of them shall be of such a character as to show all round the horizon, and to be visible at a distance of not less than 3 miles. 10

Vessels and boats, except open boats as defined in subdivision (a), when line-fishing, with their lines out and attached to or hauling their lines, and when not at anchor or stationary, shall carry the same lights as vessels fishing with drift-nets. When shooting lines, or fishing with towing lines, they shall carry the lights prescribed for a steam or sailing vessel under way, respectively. 15

In fog, mist, falling snow, or heavy rainstorms, drift-net vessels attached to their nets, and vessels when trawling, dredging, or fishing with any kind of drag-net, and vessels fishing with their lines out, shall, if of 20 tons gross tonnage or upwards, respectively, at intervals of not more than one minute, make a blast; if steam vessels, with the whistle or siren, and if sailing vessels with the fog horn, each blast to be followed by ringing the bell. Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals, but if they do not, they shall make some other efficient sound signal at intervals of not more than one minute. 20 25

PILOTS.—Pilots are obtainable at or near the principal ports in the Straits Settlements. See signals on next page. For vessels in Rhio archipelago, approaching Singapore strait, see pilot station on Pulo Sambu, page 246. The statement in certain places in Admiralty Sailing Directions that the employment of pilots is compulsory does not apply to H.M. ships-of-war. 30 35

In the ports of Netherlands India the steering commands used by pilots are “Bakboord uit” and “Stuurboord uit” (literally “Port out” and “Starboard out”). These orders apply to the direction to which the ship’s head is to turn, and not to the tiller.

Experience has shown that but little confidence should be placed in the natives who offer themselves as pilots on the west coast of Sumatra for ports seldom visited. Men, however, holding licences as pilots for this coast are obtainable at Padang. 40

Signals for a pilot.—*In the day time.*—The following signals, numbered 1-4, when used or displayed together or separately, shall be deemed to be signals for a pilot in the day time, namely:—

1. To be hoisted at the fore, the Union Jack, having round it a white border, one-fifth of the breadth of the flag; or
2. The International code pilotage signal, indicated by P.T.
3. The International code flag S., with or without the code pennant over it.
4. The distant signal, consisting of a cone, point upwards, having above it two balls or shapes resembling balls.

At night.—The following signals, numbered 1 and 2, when used or displayed together or separately, shall be deemed to be the signals for a pilot at night, namely:—

1. The pyrotechnic light, commonly known as a *blue light every fifteen minutes*; or
2. A bright *white* light, flashed or shown at short or frequent intervals just above the bulwarks, for about *one minute* at a time.

If these signals for summoning a pilot are used for any other purpose, the offender shall for each offence be liable to a fine not exceeding £20.

Distress signals.—When a vessel is in distress, and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her either together or separately, namely:—

1. *In the day time.*—1. A gun or other explosive signal fired at intervals of about *a minute*.
2. The International code signal of distress indicated by N.C.
3. The distant signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball.
4. A continuous sounding with any fog-signal apparatus.
1. *At night.*—1. A gun or other explosive signal fired at intervals of about *a minute*.
2. Flames on the vessel (as from a burning oil or tar barrel), &c.
3. Rockets or shells, throwing stars of any colour or description, fired one at a time at short intervals.
4. A continuous sounding with any fog-signal apparatus.

Signals to be made by vessels approaching ports when inconvenienced by searchlights.—Any vessel approaching a port in the British Empire when searchlights are being worked, and fearing that they will interfere with her safe navigation, may make use of the following signals, either singly or combined:—

- (a) By flashing lamp, *four short* flashes followed by *one long* flash.
- (b) By whistle, siren, or fog horn, *four short* blasts followed by *one long* blast.

Whenever possible, both flashing lamp signals and sound signals should be used.

On these signals being made, the searchlights will be worked as far as circumstances will permit, so as to cause the least inconvenience, being either extinguished, raised, or altered in direction. 5

The signals should not be used without real necessity, as unless the vessel is actually in the rays of a searchlight it is difficult to know which searchlight is affected. The signals should be repeated until the inconvenience is removed.

Note.—These signals are designed to assist mariners, and do not render the Government liable in any way. 10

FISHING STAKES.—On most of the banks fronting the shores of Malacca strait, and probably off many parts of the coasts mentioned in this volume, particularly off the mouths of rivers, fishing stakes and enclosures will be met with in depths of 3 to 5 fathoms, and in some cases in greater depths. 15

These enclosures, known as *seros* and *jermals*, are constructed of trees firmly driven into the banks, and interlaced with branches, &c., and form a considerable danger to vessels navigating at night near the depths mentioned. These enclosures last many years, and to those with local knowledge they are good landmarks for making the river mouths, especially on the east coast of Sumatra, where there are but few objects of recognition. 20

COAL is obtainable in any quantity at Singapore, Penang, Sabang bay, and Padang, in Sumatra. For other ports, *see* the Index. 25

DOCK ACCOMMODATION.—There are graving docks at Singapore, and one at Prye river on the mainland opposite Penang, also a floating dock at Sabang bay, Pulo Weh. Patent slips at Singapore and Penang. For details and dimensions, *see* Appendix II., page 475. 30

PORT REGULATIONS.—Straits Settlements.—For ports of the Straits Settlements, *see* the place affected, and Appendix I., pages 470-474.

Netherlands India.—Vessels coming from any port outside of Netherlands India are forbidden to communicate with the shore before obtaining permission from the commander of the guard-ship, or in case there is no guard-ship in the road, from the Harbour master. 35

Every vessel without a bill of health or with an unsatisfactory bill of health shall be subject to the regulations of quarantine. Every vessel from a foreign port is to be provided with a bill of health countersigned by the Dutch Consular officer at the port of departure. 40

Regulations for foreign men-of-war.—The following regulations relating to foreign men-of-war entering and anchoring in

the roads, inlets, harbours, and rivers of Netherlands India have been issued:—

ARTICLE I.

1. Wherever men-of-war are mentioned in the following regulations this term applies to:—

- 5 (a) Any foreign men-of-war belonging to a Power friendly to the Netherlands;
- (b) Any vessel having troops on board belonging to a Power friendly to the Netherlands.

ARTICLE II.

1. A notice of the entrance and anchorage of a foreign man-of-war shall immediately be sent—if possible, by telegraph—to the naval
10 commander-in-chief by the principal civil authority of the place.

In the possessions outside of Java and Madura, similar notice shall also be sent to the Head of the Governmental Administration, in case he be not himself the principal civil authority of the place.

ARTICLE III.

1. To the commander of the foreign man-of-war, the Harbour
15 master, or, in his absence, the official acting as such, shall present:—

- (a) A copy of a French, German, or English extract from these regulations.
- 20 (b) A form issued by the naval commander-in-chief in the French, German, or English language containing interrogatories respecting: Flag, charter, name, crew, armament, whence hailing, length of voyage, proposed length of stay, destination, state of health, &c.

2. A copy of the form, duly filled in, shall be transmitted without
25 delay to the naval commander-in-chief and to the Chief of the Governmental Administration.

ARTICLE IV.

1. The crew of foreign men-of-war within the boundaries of the Dutch Indies shall not be allowed to make any hydrographical or land surveys, nor to engage in disembarking drill, nor, except as provided
30 in Article V., to engage in target practice.

2. The crew shall only be allowed to come ashore unarmed, exception being made on behalf of the officers and non-commissioned officers, who are permitted to carry the sword or dirk pertaining to their uniform; the boats belonging to the vessels, when used, as well as their crew,
35 shall be unarmed.

3. The previous clause does not apply to cases of *vis major*.

4. If for particular reasons—for instance, in the case of a funeral on shore—exemption be desired from the prohibition contained in clause 2 of this article, the permission can be obtained in the chief towns of

governments from the Head of the Governmental Administration and in other places from the principal civil authority of the place.

ARTICLE V.

1. The commander of a foreign man-of-war staying at Batavia can be granted a permission for rifle practice ashore.

2. The application for the above-mentioned permission shall be made by the said commander to the naval commander-in-chief. 5

3. In case there be no objection to grant the request, the naval commander-in-chief sends a declaration to the commander in question, acquainting the latter with place and time, where the exercises can be carried on, and with the number of the rifle ranges which are at his disposal. 10

4. A naval officer is always attached to the leader of the shooting practice, in order to afford all necessary information respecting the organisation of our rifle ranges and to see that the prescriptions are followed. 15

5. The naval commander-in-chief acquaints the Head of the Governmental Administration by telephone of the foresaid permission and of the exact time when the shooting will take place.

ARTICLE VI.

Within the boundaries of Netherlands India foreign men-of-war have to respect the existing legal regulations. 20

ARTICLE VII.

1. Should any man-of-war infringe any of the foregoing regulations, the principal civil authority of the place may, if possible in conjunction with the Central Government, order the vessel to withdraw, and, if necessary, the principal civil authority may use force to compel the vessel to withdraw, but before doing so he must first consult the competent naval and military authorities. 25

2. In this latter case the competent naval or military authority shall enforce obedience by firing a live shot past the vessel at a distance of about five hundred metres, and then by firing a second shot at about half the distance of the first, and, if necessary, by further firing with live shots over the vessel, or into the riggings, and finally into the hull. 30

ARTICLE VIII.

1. The Government pilots shall be made acquainted with these regulations, and be advised by the Harbour master, or by the official acting as such, whether a salute to the Netherlands flag can be returned, and if so, from what point. 35

2. They shall, as far as necessary, inform of the aforesaid the commander of the foreign man-of-war and afford him with all information he may require with regard to the above-mentioned regulations.

ARTICLE IX.

1. The regulations apply to men-of-war belonging to Powers which are involved in war and on friendly terms with the Netherlands, as long as no other regulations for the maintenance of neutrality have been made during or after the outbreak of the war.

- 5 2. In case of a war in which the Netherlands are engaged, the same regulations will be enforced, so long as nothing to the contrary has been decided.

Wireless telegraph station.—There is a wireless telegraph station at Sabang, Pulo Weh.

PASSAGES.

- 10 **ADEN to Singapore.—Full-powered steam route.**—The route is direct; northward of Sokotra, southward of Minikoi, and round the south end of Ceylon, calling at Colombo for coal if necessary, thence through the Strait of Malacca.

Vessels of moderate powers take the same route.

- 15 **Vessels of low power.—April to October.—S.W. monsoon.**—Direct, as for full-powered vessels.

Vessels of low power, during the north-east monsoon, October to March, steam along the Arabian coast up to Ras Farták, thence under sail across the Arabian sea, under steam and fore-and-aft sails across
20 the Bay of Bengal, and under steam down the Strait of Malacca.

- Sailing route.—S.W. monsoon.**—From April to October, sailing vessels should pass north of Sokotra, and thence direct round the south end of Ceylon and across the Bay of Bengal, entering Malacca strait between Great Nicobar island and Pulo
25 Rondo. After passing the north-west end of Sumatra the south-west monsoon will most likely fail, and vessels should keep on the Malayan side of the channel, where a tidal influence prevails and there are less calms. Sometimes a brisk westerly wind will be carried as far as Penang. When once the islands on the Malay coast are sighted, there
30 will be no difficulty in getting to the southward.

For squalls in Malacca strait, during this monsoon, *see* Winds in Malacca strait, page 21.

- N.E. monsoon.**—From October to March sailing vessels should work along the Arabian coast as far as Ras Farták, or just
35 beyond it, and thence stand across the Arabian sea, passing southward of Minikoi island, and round the south end of Ceylon, and across the Bay of Bengal. Pass close to the southward of the Great Nicobar island, if the wind permit, and thence keep on the Malay side of the Malacca strait, where there are tidal streams and more favourable
40 winds.

See Ocean passages, and Track charts 1077, 1078.

The practice of steering to pass a few miles northward of Minikoi, especially by night, is a dangerous one, because the island is over 4 miles long in a north and south direction, the light is on the south-west side, and the current at times sets strongly to the southward.

SINGAPORE to Aden. — Full-powered steam routes.—Direct through the Malacca strait, and across the Bay of Bengal, southward of Ceylon and across the Arabian sea, invariably passing northward of Sokotra during the south-west monsoon, May to September, but in all seasons of the year it is desirable to avoid passing south, if Abd al Kuri is to be made at night, as the currents are often strong to the northward. 5 10

Alternative route.—There is an alternative route for vessels of moderate power from abreast Ceylon during the strength of the south-west monsoon, namely, southward of Minikoi, and keeping near the parallel of 8° N. until westward of long. 60° E., thence hauling up for Ras Hafun and Ras Asir, observing the precautions given in Africa Pilot, Part III. 15

SINGAPORE to Calcutta. — Full-powered steam route.—Direct, through Malacca strait and Preparis South channel.

Low-powered vessels and sailing vessels. — October to March.—Up to mid-January pass east of the Andaman islands. After mid-January pass south of the Andamans, or through Duncan passage, and work, or steam, to the northward in the middle of the Bay of Bengal, as north-west and westerly winds are then found north of the Andamans. 20 25

April to September.—Pass to the southward of the Nicobars and direct for the Orissa coast.

CALCUTTA to Singapore. — Full-powered steam route.—Direct, through Preparis South channel and Malacca strait.

Vessels of low power and sailing vessels. — September to May.—Through Preparis North or South channel, and direct through Malacca strait. 30

March to September.—Direct, through Preparis South channel and Malacca strait.

SINGAPORE to Ceylon and Coromandel coast. — Full-powered steam routes.—Through Malacca strait direct. 35

Vessels of low power and sailing vessels. — October to March.—For the Coromandel coast keep along the Malay coast up to Junkseylon or Salang island and through the Sombrero or Ten-degree channel, making the land to the northward until February. 40

To Ceylon, proceed direct, but if westerly winds are found off Acheh head, which is probable in October and November, keep more to the northward.

See Ocean passages for the World; also Track charts 1077, 1078.

April to September.—Keep along the north coast of Sumatra, pass through Bengal passage, and work, or steam, across the Bay of Bengal, but in the height of the S.W. monsoon (in June, July, and August), and also when bound to Ceylon, from a good berth off
5 Acheh head cross the equator, and make westing in the S.E. trade, and recross the equator in about long. 83° E.

For Colombo, recross the equator in about long. 77° E.

CEYLON and COROMANDEL COAST to Singapore.—Full-powered steam route.—Direct.

10 **Vessels of low power and sailing vessels.**—October to March.—Direct, through Malacca strait.

April to October.—Pass to the southward of the Great Nicobar, through Bengal passage, and Malacca strait.

See Ocean passages for the World; also Track charts 1077, 1078.

CHAPTER II.

MALACCA STRAIT, NORTHERN APPROACH; WESTERN SHORE.—
NORTH COAST OF SUMATRA, AND ADJACENT ISLANDS.

VARIATION IN 1915.—Westerly, increasing $1\frac{1}{2}$ minutes annually.

Chart 219, Acheh head to Diamond point. Var. nil.

MALACCA STRAIT is the fairway used by vessels from Europe and India when bound to Penang and Singapore and to the China sea. Its northern approach lies between Acheh head, the north-west extreme of Sumatra island, and Salang or Junkseylon island, about 220 miles north-east of it, with the Nicobar islands stretching north-west of Acheh head. 5

The strait is about 500 miles in length from abreast the points mentioned, to Tanjong Bulus, and the Karimun islands, about 8 miles apart, where it joins Singapore strait. 10

It is deep throughout, the least water, about 14 to 15 fathoms, being found in the fairway westward of One Fathom bank lighthouse.

The least breadth of the navigable channel with depths over 10 fathoms, is about 6 miles, near One Fathom bank, and about 4 miles, between Fair channel and Long banks, westward of Pulo Pisang lighthouse. 15

The fairway from abreast Diamond point is well defined by Pulo Perak, Pulo Penang, Pulo Berhala, One Fathom bank lighthouse, the Aroa island, Cape Rachado, &c., besides the mountain peaks on either side, and at night by Pulo Weh light in the north-west approach, Diamond point light, Muka head light, Pulo Penang, Cape Rachado light, Pulo Pisang light, and that on the Brothers at the entrance to Singapore strait; there are many other lights of less power bordering the strait, useful when within range of them, so that the strait is navigable at all times, both by day and night. 25

Tides.—Currents.—For the tides and currents, *see* Chapter I., pages 28-30, as well as in the body of the work.

Directions for sailing vessels will be found in certain localities also in the body of the work.

General charts 2670, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Magnetic disturbance has been reported south-east of Ayer Jambu or Diamond point and also south-east of Pulo Berhala, as shown on the charts 1353, 1355.

- 5 **ISLANDS off North coast of Sumatra.—Pulo Rondo**, or Tepurong (*Lat. 6° 4' N., Long. 95° 9' E.*), is the northern of the islands lying off Acheh head, the north-west point of Sumatra, and the west side of the northern approach to Malacca strait. The island is 426 feet high, wooded, $2\frac{1}{2}$ cables in length, steep to on its northern side, and about 30 miles off-shore, with Pulo Weh between. It appears from all sides as a flattened half sphere. Rocky islets, from 75 to 150 feet high, lie on a reef, composed of rock and coral, which extends to the distance of one mile from its southern side. Depths of about 100 fathoms are found at a short distance from the island and rocks.

Anchorage.—Temporary anchorage may be obtained on its western side in 8 fathoms water, with the extremes of the island bearing 103° and 44° true, but occasionally the heavy surf renders anchoring or landing dangerous.

- 20 **PULO BRAS or Breueh**, also known as Iampujang, situated about 20 miles southward of Pulo Rondo, is the westernmost of the islands off Acheh head; it is $8\frac{1}{2}$ miles in length, in a north-west and south-east direction, 6 miles in breadth at its south end, and attains in Gunong Chumo, about the middle of the island, a height of 2,296 feet. It is a rugged island with several bays, affording anchorage according to the prevailing monsoon. On the southern part of the island there is a considerable expanse of flat land, with villages and cocoa and sugar plantations under the hills.

The population is scanty.

- 30 The coast generally is steep and craggy from the sea, but in a few places ledges and rocks extend a quarter of a mile off-shore, there are sandy beaches within the bays and along almost all the south coast.

- 35 **LIGHTS** (*Lat. 5° 45' N., Long. 95° 4' E.*).—A light is exhibited at Willemstoren, the north point of Pulo Bras, from a cylindrical tower, 147 feet in height, painted white to a height of 98 feet, and red the remainder. See Light list, and views *a* and *b* on page 56.

The light-keeper's dwelling, of white stone, is situated near the lighthouse.

- 40 **Villages.**—On the south side, where there is a comparatively large plain, there are many villages surrounded by cocoanut trees and sugar plantations. In the north-west part there are small pepper plantations. The population is sparse.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Anchorage.—Depths of 15 to 20 fathoms, over sand, will generally be found within about one mile of Pulo Bras, where vessels may find temporary anchorage during fine weather, but the bottom is foul in most places, being chiefly coral or rock; in the bays the bottom is chiefly sand. 5

Islets and rocks.—**North-west islet**, bearing 295° true, distant about 6 miles from Willemstoren lighthouse, is a small rocky, overgrown islet 25 feet high, and fringed by a narrow reef of rocks. 10

Three small rocky islets lie off the north coast of Pulo Bras; the two western islets, fairly close together, are situated with Willemstoren lighthouse bearing 94° true, the western being distant about 3 miles; the northern islet lies with the lighthouse bearing 302° true, distant $1\frac{1}{2}$ miles; the sea breaks on these islets even in moderate weather. 15

A sunken rock lies 3 cables off the point situated $1\frac{3}{4}$ miles westward of the lighthouse, and another the same distance off-shore at 6 cables westward of the lighthouse.

There is a passage between North-west islet and the inner islets, but it is recommended to pass outside them all. 20

Fleurs rock, small, and having a depth of about 6 feet, lies about $1\frac{3}{4}$ miles 279° true, from the west point of Pulo Bras. The water in the vicinity of Fleurs rock is discoloured, and breaks at times. 25

Plan of Lambaleh bay on 219.

Lambaleh bay, or Lho Leuen Bale (*Lat. $5^{\circ} 43\frac{1}{2}'$ N., Long. $95^{\circ} 6\frac{1}{2}'$ E.*), on the north-east side of Pulo Bras, is nearly $1\frac{1}{2}$ miles wide between its entrance points, with depth of about 18 fathoms on a line joining them, thence shoaling gradually to the shore. Ujong Punir (Peuneu), the north entrance point, is precipitous, with a depth of 19 fathoms close-to. 30

About half a mile westward of Ujong Punir is a sandy beach, and some buildings of a former blockhouse remain in the north-west part of the bay. There is a road across the island from here. 35

There is a small pier in the bay.

Chart 219, Acheh head to Diamond point.

Anchorage.—Good anchorage may be obtained during the south-west monsoon, and although squalls from the hills are sometimes violent, the water is smooth, but a considerable sea sets in during the north-east monsoon, when it is advisable to have two anchors down. 40

Steam vessels usually anchor in 7 fathoms under Ujong Punir, with Ujong Bahu, Pulo Weh, in line with it. Sailing vessels anchor in a depth of 10 fathoms with Ujong Punir in line with Pulo Rondo.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Tides.—See Tides, north coast of Acheh, page 30.

Current.—A strong current usually sets northward past Ujong Punir.

- 5 The north-east coast of Pulo Bras from Lambaleh bay to Lampujang, the south-eastern point of the island, is rocky; Lampujang village is situated at about a mile northward of the point.

Plan of Balken and Sand bays on 219.

- 10 **Balken and Sand (Lho Kruet) bays** are situated on the west side of Pulo Bras, being only separated by a high point. The beaches in these bays are sandy; on the shore of Balken bay there is a large village named Mulingga (not charted), and on the south-eastern side of Sand or Lho Kruet bay a rocky point 200 feet high.

- 15 Pulo Sidom or Pylmer islets are two high rocks lying close together on the north side of entrance to Balken bay. At $1\frac{1}{2}$ cables, 223° true, from the southern rock, is a rock which breaks, with another nearer the islets. Merdu or Si Mereguh, a conspicuous dome-shaped peak, in Pulo Weh, seen through the valley within Sand bay, bearing about 75° true, leads into Balken bay, 2 cables southward of these dangers.
- 20 See view *e* on page 56.

Anchorage.—Both bays afford anchorage safe during the north-east monsoon only, in depths of from 8 to 9 fathoms, over fine sand; in the south-west monsoon there is considerable swell and sea.

Plans of passages between Pulo Bras and Sumatra, 3702.

- 25 **Lambaru bay or Lho Lam Baro** (Lat. $5^{\circ} 39' N.$, Long. $95^{\circ} 5' E.$), southward of Balken bay, affords anchorage during the north-east monsoon. A good position, in a depth of 9 fathoms, is with the north-west point of the bay bearing 292° true, and the south point 190° true. The bays on the western side of Pulo Bras are not
- 30 available during the south-west monsoon.

Pulo U, a rocky islet off the north point of the bay, has a rock about 2 cables north-west of it on which the sea always breaks; it should be given a berth.

- 35 **Reef.**—A reef extends about 2 cables off Ujong Serapong, the south-western extreme of Pulo Bras.

Sungi Seranbuang is a small stream on the southern side of the island; Oleh (Ulée) Paja village is situated here; the approach is foul.

- 40 Tuan Dipat, an islet connected to the shore by a reef, is situated nearly 2 miles eastward of Sungi Seranbuang; a sunken rock lies about half a cable south-west of it.

Blang Situngkoh village lies near the coast, within a cliffy point, westward of Tuan Dipat.

General charts 219, 2760, 70.

Plans of passages between Pulo Bras and Sumatra, 3702. Var. nil.

Anchorage.—Good open anchorage may be obtained westward of the islet, and landing is easily effected on its eastern side.

Pulo Nasi Kechil or Keureuse lies about 6 cables off the south-west end of Pulo Bras; it is $2\frac{1}{2}$ miles in length, lofty and overgrown with brushwood, and has several small houses on its northern side (not charted). The north coast is rocky and steep, the south and east coasts are sandy beaches. A sandbank, with depths of one to 3 fathoms, extends north-eastward, for a distance of a quarter of a mile from the north-east coast; a patch of 3 fathoms lies about one cable off the centre of its northern coast (not on Dutch chart).

Arus Kersik or Aorih Keureuse, the passage between Pulo Bras and Pulo Nasi Kechil, has a fairway depth of 6 to 14 fathoms over half a mile in width, and is navigable, but the tidal streams are strong.

The Gepon islets are a group of four islets or rocks, half a mile in length north and south, off the south side of Nasi Kechil, distant about $4\frac{1}{2}$ cables; the neighbourhood has not been closely sounded. The three northernmost are wooded and about 130 feet high; the southernmost is a rock about 30 feet high.

Pulo Nasi Besar or Dedap (Deudab) nearly joins the south-east point of Pulo Bras, being separated by Lampujang strait, a rocky channel $1\frac{1}{2}$ cables in breadth, in which there is a depth of 12 fathoms.

The island is triangular in shape, about 4 miles in length, and $4\frac{1}{2}$ miles in breadth on its southern side, which forms the northern shore of Cedar passage.

The coastline is rocky in places, and in others, chiefly on the west side, there are sandy beaches. The water is fairly deep all round, the 5-fathoms contour line being within 3 cables of the coast.

Inhabitants.—The island is fairly thickly populated, the inhabitants being for the most part engaged in the cultivation of pepper.

Plan of Lampujang strait on 3702.

Lampujang strait separates Pulo Bras from Nasi Besar. It is 2 cables wide with a fairway depth of 12 fathoms.

A rock, awash at low water, lies on the southern side of the eastern entrance at half a cable off-shore, and another nearer the shore westward of it.

A narrow shoal, $1\frac{1}{2}$ cables in length, with a least depth of $2\frac{1}{2}$ fathoms, lies between one and $2\frac{1}{2}$ cables off the west point of the western entrance, southern shore.

A narrow shoal, half a mile in length, with depths under 3 fathoms, lies in the north side of the western entrance; its south extreme of

General charts 219, 2760.

Plan of Lampujang strait on 3702. Var. nil.

2½ fathoms, lies 259° true, distant 4½ cables, from the south extreme of Lampujang, north side of entrance, and 2 cables from the shore just mentioned.

- 5 The passage should only be used by small vessels, as the tidal streams are uncertain, and the two shoals bordering the fairway are unmarked.

Plans of passages between Pulo Bras and Sumatra, 3702.

- 10 In Pasijaning bay (Lho Pasi Janing), on the west side of Nasi Besar, during the north-east monsoon, there is good anchorage in depths of from 6 to 8 fathoms, over fine sand, but it is not available during the south-west monsoon. Landing may be effected at the village, where there is a break in the coast reef.

On the south side, in Alur Ajeun bay, there is also anchorage. See Cedar passage, below.

- 15 **Rots bay or Telok Jamir Kechil**, on the north-east side of Pulo Nasi Besar, is about 4 cables wide at the entrance and the same in length, but sunken rocks extend out to the 5-fathoms contour; vessels should not go inside this line. Off the south point of the bay is Rots islet, or Pulo Jeuroh, 187 feet high, one cable in extent, round
20 and thickly overgrown.

Anchorage.—During the south-west monsoon there is good anchorage in about 6 fathoms water, with Rots islet bearing 132° true, distant about 3 cables. The anchorage is said to be better southward of the islet, abreast a long sandy beach, in from 8 to 10 fathoms.

- 25 **Pulo Angkasa or Lumpat** (Bunta), a small rocky uninhabited island, is separated from Acheh head by a channel, 1¾ cables wide, and from Pulo Batu by Lumpat strait.

- 30 **CEDAR PASSAGE, or Aroih Raja** (Lat. 5° 34' N., Long. 95° 16' E.) lies between Pulo Nasir Besar or Dedap, on the north, and Pulo Kelapa and Pulo Batu on the south, and is about 1½ miles wide.

Northern shore.—**Ujong Balee**, the south-west extreme of Nasi Besar, is the north-west point of the western entrance; it is free from danger.

- 35 Eastward of it is Ujong Ratbakah, with a rock awash at low water at one cable off it.

- Alur Ajeun bay lies between Ujong Ratbakah and Ujong Bau. It affords temporary anchorage in from 7 to 10 fathoms, but there is a strong current here when the eastern stream is setting through
40 Cedar passage. During westerly winds the anchorage is not tenable.

Eastward of Ujong Bau the coast is clifty to Ujong Dungon, and from thence to Ujong Mpèe, the east extreme of the strait, it is low, with a number of dwellings near the shore. There is a break in the

General charts 219, 2760.

Plan of passages between Pulo Bras and Sumatra, 3702. Var. nil.
shore reef about midway, seen from the strait, through which boats can effect landing.

Southern shore.—Pulo Kelapa (Klapa), 802 feet high, and about 2 miles in length, lies between Cedar and Surat passages, and is covered nearly to the summit with casuarina trees. There is a village inland from the northern side. The island is fringed by reef, with boulders on it in places. The reef extends about half a cable eastward of the island, with rocks above water at its extreme; also for a distance of 2 cables westward of the island, with a large rock or islet at its extreme.

The shoal between Pulo Kelapa and Pulo Batu has $2\frac{1}{2}$ fathoms least water over it, but it lies out of the track of shipping. It affords temporary anchorage for small craft, but the streams are very strong between the islands.

Pulo Batu (Batee), lying about one mile north-eastward of the eastern end of Pulo Kelapa, is a long and narrow island, generally uninhabited. An islet, named Usamlakoh, lies off the western end of the island.

A reef of rocks extends half a cable eastward of the island towards Pulo Angkasa, and there is a narrow channel, Lumpat strait, about half a cable wide, and having depths of 7 fathoms between this reef and the rock above water close off Pulo Angkasa. Its northern side rises almost perpendicularly, and has deep water close-to.

Fairway dangers.—At rather over a mile, 216° true, from Ujong Ratbakah, north side of the passage, is a rock awash, with sunken rocks northward of it, a cable apart, with deep water at a cable distant from them. They are marked by breakers. In the eastern part of the fairway, and on the western part of a bank, under 10 fathoms, is a group of sunken rocks about $2\frac{1}{2}$ cables in extent in a north and south direction. A rock awash at low water near the centre lies with Tanjong Dungon abreast it, bearing 344° true, distant 8 cables; the northern rock, with a depth of $1\frac{3}{4}$ fathoms, lies $1\frac{1}{2}$ cables nearer the point.

These rocks are usually marked by breakers.

Plans of the north-west coast of Sumatra, 3702.

Directions.—Cedar passage is available for steam vessels and sailing vessels, with a commanding breeze and a fair stream, coming from the west coast of Sumatra, bound either eastward to Olehléh or northward to Sabang bay. A favourable opportunity for working through it, or through Surat passage, occurs but seldom. See view *d* on page 56.

In the easterly monsoon, it sometimes happens that there is practically no flood or easterly stream for several days after the moon's quadrature, but a sailing vessel attempting either of these passages

General charts 219, 2760.

Plans of the north-west coast of Sumatra, 3702. Var. nil.

and making no progress should either anchor or proceed round westward of Pulo Bras for Bengal passage.

Proceeding westward through the strait, sailing vessels may use it
5 with a commanding breeze and with a favourable stream, at a time when otherwise it would be necessary to work through Bengal passage. Vessels should pass well off the entrance to Surat passage to avoid the indraught.

The track recommended is along Pulo Kelapa and Pulo Batu, on
10 the southern shore, southward of the dangers above described. The northern side is sometimes used. A good berth must be given to the rock which is awash or dries at low water northward of the main fairway, and that farther eastward.

Tides.—It is high water, full and change, in Cedar passage, at
15 about IXh.

Tidal streams.—The flood sets eastward from about low water to about high water at rates of from $3\frac{1}{2}$ to 4 knots an hour, and the ebb westward at rates of from $4\frac{1}{2}$ to 5 knots. The ebb is usually of longer duration than the flood, and there is but little slack water. At
20 neap tides, and also during the north-east monsoon, there is little or no east-going or flood stream, and the west-going or ebb stream, combined with the prevailing westerly current, is strong.

Tidal rips, at times appearing almost like breakers, form in Cedar and Surat passages; they are most violent during the ebb
25 stream in the south-west monsoon and during the flood in the north-east monsoon, that is, with the wind against the stream; in the latter season they are comparatively moderate. They are sometimes dangerous to small vessels at anchor in the passages.

SURAT PASSAGE or Aroih Chut (*Lat. $5^{\circ} 33' N.$,
30 Long. $95^{\circ} 14' E.$*), between Pulo Kelapa, Pulo Batu, and Pulo Angkasa on the north-west, and the promontory of Aceh, between King point or Ujong Raja and Aceh head, on the south-east, is funnel-shaped, narrowing from about 2 miles in its western entrance to less than 2 cables in width at Aceh head, and with from 12 to 20 fathoms
35 water in it and no shoals.

Directions.—Surat passage is about 4 miles shorter for vessels coming from the west coast of Sumatra. It may be used by short steam vessels, having a speed of not less than 8 knots but it is not recommended for sailing vessels, as it is much subject to calms, and
40 the tidal streams are rapid, but if the latter should use it, with a favourable stream, they should keep nearer Aceh head than the opposite side of the channel, as Aceh head is bold. Having rounded King point or Ujong Raja, the north-west point of Sumatra, at

General charts 219, 2760.

Plans of the north-west coast of Sumatra, 3702. Var. nil.

the western entrance to the passage, the eastern entrance, between Acheh head and Pulo Angkasa, will be seen open, and may be steered for, bearing 49° true. A good rate of speed must be maintained when passing through the narrow eastern entrance. 5 From thence course may be shaped round Acheh head, or northward for Pulo Weh.

The south side of Pulo Kelapa is safe to approach, there being depths of from 10 fathoms at a quarter of a mile of its south point. If the tidal stream be unfavourable, a sailing vessel must anchor until 10 the flood stream makes. See the directions for Cedar passage, page 47, and view *d* on page 56.

It is not considered advisable to use Surat passage from the eastward except locally acquainted.

Tidal streams.—The flood stream sets north-eastward directly 15 through the passage, and the ebb in the opposite direction, at rates of from 5 to 6 knots an hour at springs, respectively, in the narrowest part, abreast Angkasa, where the eddies caused by the rapid streams render steering difficult, if not dangerous, for sailing vessels during light winds. An eddy prevails under Angkasa, which combined with 20 the tidal stream coming between Kelapa and Batu, causes a confused sea, sometimes assuming the character of whirlpools.

Chart 219, Acheh head to Diamond point.

PULO WEH.—General remarks.—Aspect.—Pulo Weh the north-easternmost and largest of the islands off Acheh head, is 25 separated from the Sumatra coast by Malacca passage, about 9 miles wide. The island is about 11 miles in length in a north-west and south-east direction, from 2 to 6 miles in breadth, mountainous, and covered with luxuriant vegetation. Lemoh Mati, or Leumo Mate (*Lat. $5^{\circ} 47' N.$, Long. $95^{\circ} 21' E.$*), the summit, is 1,916 feet high, and 30 may be seen in clear weather from a distance of 36 miles. At about $1\frac{1}{4}$ miles south-south-east of it is Merdu or Si Meregu, 1,772 feet high, and southward of Sabang bay is a conspicuous summit, 1,191 feet high. Northward of Sabang is Peunimpu, a detached hill, 279 feet high. Except in a few places, the coast is rocky, rising sheer from 35 the sea. The east and west coasts are fairly straight with deep water generally close-to; the north coast is indented by Peria Laut and Sabang bay, and the south coast by Balahan bay. Safe anchorage can only be obtained in the innermost portion of the large bays, near the shore. 40

Small villages lie scattered over the island, which is thinly populated. The chief industries are pepper growing and fishing; sulphur is found in considerable quantities, a sulphur spring being about 2 hours' walk from Balahan village. Aneu Laot, a small lake, lies in

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

the north-east portion, where, and also in Balahan bay, are several streams of fresh water.

Epidemics are unknown, and the island is considered to be healthy.

- 5 **Tide-rips** are seen at times westward of the islands northward of Acheh head, on the north-west and south-west sides of Pulo Weh, and northward of Pulo Bras. They are heaviest in the south-west monsoon, and are distinguishable by the peculiar eddies which they form in the space between the Nicobar islands and those off Acheh. The south-west stream near the Nicobar islands meeting the easterly streams north of Pulo Weh and the streams setting north-westward through the channels of the Acheh group, cause whirlpools and tide-rips, which are sometimes increased by the wind and sea. On the north side of Malacca passage, and near Karang Berduri, heavy overfalls occur, and are sometimes mistaken for breakers.

- West coast.**—Ujong Bahu or Bau, the north-west point of Pulo Weh, falls steeply from the mountain to the sea, and is surrounded by masses of rock which have fallen away from above, beyond which it is steep-to. The whole west coast is clifty, excepting a sandy bay between Ujong Putru and Ujong Guhu Sarang, but a reef, steep-to, extends 2 cables off-shore between Ujong Bahu and Cape Temanjung (Ujong Raja); from its extreme, with a depth of 4 fathoms, Ujong Bahu bears 6° true, distant $1\frac{3}{4}$ miles.

- Anchorage.**—In Teupin Anu the sandy bay between Ujong Putru and Ujong Guhu Sarang, there is good anchorage, during the north-east monsoon, in from 10 to 12 fathoms water; and to the southward, between Berduri point (Ujong Cheuhum) and Ujong Menduru, off Paja village, there is anchorage in a depth of 10 fathoms.

- South coast.**—**Karang Berduri**, small, and awash at low water spring tides, lies 6 cables southward of Ujong Berduri (Menduru), the south end of Pulo Weh; a rock with a depth of 3 fathoms lies $1\frac{1}{4}$ miles, 56° true, eastward of Karang Berduri and 3 cables off-shore; there are usually strong tide-rips or overfalls near these rocks.

- Tides.**—It is high water, full and change, at Pulo Weh, at IXh. 45m.; springs rise 7 feet, neaps $4\frac{3}{4}$ feet. The highest tides occur about 2 days after full and change, and, in May, are highest during the day and in November during the night.

- Balahan or Balohan bay**, on the south-east side of Pulo Weh, is nearly 2 miles in length, and $1\frac{1}{2}$ miles in breadth across the entrance, with depths of from 40 to 80 fathoms; a reef fringes the eastern and western shores of the bay for a distance of half a cable.

Ujong Sekeh, or Seuke, the east point of entrance to the bay, is a lofty point with depths of from 30 to 40 fathoms close-to.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point . Var. nil.

Somewhat inland from the head of the bay is Balahan, or Balohan, the largest village on the island, and the residence of the chief of Weh. Near the village are fresh water springs and a stream. There is a sulphur mine in the vicinity, distant about 2 hours' walk, and near the foot of a hill fumes issue from a small crater; some boulders of stone, resembling granite, are found. 5

Anchorage may be obtained, in depths of not less than 16 fathoms, at about half a cable off the sandy shore at the head of the bay; it can be used in both monsoons, but most shelter is afforded during the south-west. 10

Ayer Melek (Ujong Hud), a point midway on the east coast, has a rock above water just northward of it.

Ujong Tapa Gaja, the north-east point of the island, is not very high, but rises rapidly towards the mountains within. 15

LIGHT (*Lat. 5° 54' N., Long. 95° 21' E.*).—From a white iron framework, 42 feet in height, erected on Tapa Gaja, is exhibited a light, for which see the Light list.

Plan of Sabang bay on 2201.

SABANG BAY, situated within and eastward of Masam point, is nearly one mile in length between Pulo Kelas and the head of the bay, the entrance being $4\frac{1}{2}$ cables wide; the depths are from 12 to 20 fathoms, with a bottom of sand, coral, and gravel, and the head of the bay is completely sheltered from wind and sea at all seasons. 20

To the southward of Pulo Kelas is Lho Krueng Raja, a small snug bay about half a mile long in an east and west direction, and a quarter of a mile wide; it is approached by a channel less than a cable in width, to the eastward of Pulo Kelas, with depths of about $3\frac{1}{2}$ fathoms, but inside it deepens to 10 fathoms, over mud. 25

The eastern side of Sabang bay is fronted by a bank with depths under 3 fathoms, to the distance of a cable; the head of the bay, where are the wharves and pier, is free. Masam point and the coast westward of it is shallow to the distance of half to three-quarters of a cable. 30

Pulo Kelas or Klah, about 4 cables in length, in an east and west direction, and 121 feet high, is entirely overgrown except on the east side; on its south side is a cove with a good landing place. Its west side is connected with the main island by a reef with a depth of one fathom in the fairway over it. 35

Sekuna point (Ujong Seukundo), the west extreme of Sabang bay, is 307 feet high, and wooded. There is a tree on the hill within it, 330 feet above high water. 40

General charts 2760, 70.

Plan of Sabang bay on 2201. Var. nil.

LIGHTS.—Pulo Kelas (*Lat. 5° 53' N., Long. 95° 19' E.*).—

A light is exhibited on the north point of Pulo Kelas, from a white iron framework, 42 feet in height. The keeper's dwelling is of stone
5 with a red roof.

Masam point, or Ujong Lho Me.—A light is exhibited, from a white iron frame, 42 feet in height, situated on Masam point. See the Light list.

Jetty.—A jetty, 279 feet long, extends in a 163° true direction,
10 from near Masam point light-structure.

Buoys.—A black can light-buoy, exhibiting a *red fixed* light, marks the south point of the reef which extends from Masam point.

Two white conical buoys mark the northern edge of the shoal extending northward of Pulo Kelas.

15 A white conical buoy marks the edge of the shoal water on the east side of the bay, off Panchur.

Pilots.—The Sabang Shipping Company supply pilots free of charge.

Anchorage.—Directions.—The port limit is a line drawn
20 from the lighthouse on Masam point to Sekuna point, to the south-westward. The anchorage in the northern part of the harbour, in from 15 to 20 fathoms water, is good at all times, the bottom being a combination of sand and coral.

Vessels entering at night should give a berth to the light-buoy off
25 Masam point.

Anchorage may also be obtained by small vessels in the snug harbour southward of Pulo Kelas or Klah, in a depth of 10 fathoms, mud bottom, but the channel leading to it is less than a cable in width, with a depth of 3½ fathoms. There are sunken rocks with but little
30 water on them just within the 3-fathoms contour on the western side, but the fairway is clear.

Tides.—It is high water, full and change, in Sabang bay, at Xh.; springs rise 5 feet.

Weather signals.—For state of weather in the Bay of Bengal,
35 see pages 25-26.

Settlement.—There is a Dutch settlement at the northern head of the bay, and a small fort on a plateau about 100 feet above the sea; the native population is about 800, who make a living out of pepper and cocoanut plantations. The Colonial Government is represented
40 by a Controller. The post and telegraph office, Harbour master's

General chart 2760.

Plan of Sabang bay on 2201. Var. nil.

office, and the police station are all in the same building, near the piers on the eastern side of the bay. On the plateau above are an hotel, the residencies of the Europeans, the officers of the Civil authorities, and the chief of the garrison. 5

The Sabang Bay Harbour and Coal Company's settlement, in addition to coal sheds, workshops, &c., contains houses for their European staff, with Coolie dwellings, a hospital, and post and telegraph offices.

Lloyd's signal station.—There is a Lloyd's signal station on Penimpun, the hill, 279 feet high, westward of the settlement; it has telegraphic communication with all parts of the world, and will receive pyrotechnic night signals. 10

Wireless telegraph.—A wireless telegraph station, always open for public use, is established on the same hill. The call letters are P.K.A. 15

Telegraph.—Sabang is connected with Olehléh by submarine cable.

Steam communication.—The Royal Packet Company's steamers running between Singapore and Padang, and touching at the ports on the West Coast of Sumatra, also those between Penang and Batavia, call fortnightly; there is, besides, a direct fortnightly service between Sabang and Deli, and weekly with Olehléh. Dutch mail steamers, from and to Europe, call every fortnight. 20

There is daily communication with Olehléh. See also Chapter I., page 18. 25

Coal wharves.—Welsh and Bengal coal of the best quality, also Sumatra coal can be obtained. About 50,000 tons are kept in stock, and from 180,000 to 200,000 tons annually imported. Cardiff, Bengal, and native coal are always in stock. The coal sheds afford a storage capacity of 50,000 tons. Five electric transporters are in use, capable of loading at the rate of 150 tons an hour. There are iron lighters, each capable of carrying 150 tons, for vessels coaling in the anchorage. 30

If ordering coal by cable, the telegraphic address is "Harcoal, Sabang."

The coaling wharves have an extent of 1,679 feet, with depths of 30 to 40 feet alongside; this length probably includes the accommodation at the pier at the west end of the coaling wharves. They are lighted by lamps. 35

The hauling-off buoys are reported to be too close in for a long vessel to use, and too slackly moored to be reliable. At night lantern lights are exhibited on them, to facilitate vessels going alongside the wharves. 40

General charts 219, 2760.

Plan of Sabang bay on 2201. Var. nil.

Petroleum wharf.—There is a petroleum wharf 482 feet long on the eastern side of the bay, northward of Sungi Panchur, with two mooring buoys off it. Near it are two oil tanks of 4,000 tons capacity.

5 Water is laid on to the wharf, and its extreme is marked by a light.

Coal signals.—Vessels requiring coal, when within a mile of the bay, in order to expedite despatch, should use their steam whistles; the long blasts should sound about ten, and short about three, seconds. The signals are as follows:—

- | | | | | | |
|----|-------------------|---|---|---|-------------------------|
| 10 | Requiring 50 tons | - | - | • | One short blast. |
| | „ 75 | „ | - | - | Two short blasts. |
| | „ 100 | „ | - | - | One long blast. |
| | „ 150 | „ | - | - | One long and one short. |

15 And so on, long blasts denoting quantities in hundreds, and short blasts 50 tons or greater portion thereof.

The approach of vessels is signalled from the signal station on Penimpun hill, day and night. Morse signals are used at night.

Wharves.—Eastward of the long coaling wharves there is a trading wharf 367 feet long, with sheds between them. There is another 20 wharf, 66 feet long, also fitted with sheds; its extreme is lighted.

Southward of these wharves is the petroleum wharf mentioned with the coaling wharves; its extremes are lighted.

Pier.—There is a pier about 700 feet long between the dock and the coaling wharves, with deep water alongside, as charted.

25 **Supplies.**—About 500 head of cattle are kept in stock; bread and vegetables plentiful at one day's notice; fish, ice, and ships' stores are obtainable.

Water is abundant, and of good quality; it is laid on to the coaling jetties from the Sabang reservoirs. There is also a water tank.

30 **Docks.**—There is a floating dock, and a slipway for small vessels. See Appendix II., page 475.

Repairs.—Small repairs to hull and machinery can be executed. Vessels undergoing repairs are moored at the west end of the coal wharf, near the dock.

35 **Pratique.**—The medical officer attached to the garrison issues bills of health free of charge. There is a temporary quarantine station at Pulo Rubia, 3 miles distant.

Trade.—The principal imports are coal, haberdashery, matches, biscuits, butter, cotton goods, cement, motor-cars and cycles, machinery, implements, &c. 40

For trade, see Sumatra, page 17.

General charts 219, 2760.

Plan of Sabang bay on 2201. Var. nil.

No dues.—No port or anchorage dues are charged in Sabang bay.

In 1910, the number of steam vessels engaged in foreign trade which entered the port was 451, having a total tonnage of 3,757,000 tons.

Tug.—A steam launch is always in readiness to assist vessels entering the harbour.

Climate.—The climate is similar to that of Singapore, and very favourably influenced by the monsoons; the wind blowing, according to the monsoon, from N.E. or S.W. Calms are prevalent during the months of March and April, but in Sabang bay there is always a light mountain breeze.

Epidemics are unknown, and the island is very healthy.

Chart 219, Acheh head to Diamond point.

COAST.—**Peria Laut bay, or Loh Pria Laot** is the head of the great bay which lies between Ujong Bahu and Ujong Tapa Gaja lighthouse, 6 miles apart, between which points the bay extends southward for about 4 miles, with Sabang bay on its eastern shore. Peria Laut bay is about 2 miles in length and breadth, with good anchorage near its head in depths of from 9 to 12 fathoms just westward of Peria Laut stream, the bar of which dries at low water. Near the head of the bay there are one or two streams of warm, sulphur-laden water. Farther westward a number of rocks uncover near the shore, and the depths shoal suddenly from 16 fathoms to about 4 fathoms.

A patch with a depth of 5 fathoms lies about $1\frac{1}{2}$ cables from the shore, between Ujong Murung and Ujong Bateh Matien, on the western side of the bay, and at about half a cable northward of the latter point is a patch of 4 fathoms; both are steep-to. The coast is fronted to a short distance by a reef with rocks above water.

Plan of Rubia island anchorage on 2201.

Pulo Rubia (Lat. $5^{\circ} 54' N.$, Long. $95^{\circ} 16' E.$), nearly 9 cables in length, in a north-north-west and south-south-east direction, and about 2 cables in breadth, consists of small wooded hillocks, the highest being 133 feet in height.

Rock.—At about 70 yards south-west of its southern point there is a rock with a depth of 3 feet.

Buoy.—A black can buoy, in 5 fathoms, lies about half a cable southward of the point, and about the same distance south-east of the rock; craft should not pass between it and the island.

Bateh Murunrun, the eastern extreme of the bight in which Pulo Rubia is situated, has rocks above water on the reef which extends

General charts 219, 2760.

Plan of Rubia island anchorage on 2201. Var. nil.

1½ cables north-west of it. There are rocks dry at low water a little beyond the outer rock. Pulo Rondo, open eastward of Selako, leads eastward of them.

- 5 **Quarantine.**—There is a temporary quarantine station on the island, as mentioned with Sabang.

Anchorage.—Anchorage may be obtained, in about 13 fathoms, at 1½ cables eastward of the south extreme of Pulo Rubia at a cable distance off-shore.

- 10 The channel, about 1½ cables in width, between Pulo Rubia and the main island, also affords anchorage in from 8 to 9 fathoms water.

- Pulo Selako** (Seulaku), nearly 3 cables northward of Pulo Rubia, is about 200 feet high, and has a rock above water lying about one cable northward of it. Between Selako and Rubia is a rock above
15 water, and between this rock and Selako are patches of 1½ and 2 fathoms steep-to. The channel between the rock and Pulo Rubia has a depth of 13 fathoms.

- Coast.**—Telok Ibu, an inlet one cable wide, and a quarter of a mile in length, lies westward of Pulo Rubia; the greater part of it is
20 shallow. From thence northward of Chempuli Buta to Ujong Bahu, a distance of about 2 miles, it is fringed by a narrow reef, which is steep-to.

Tides.—It is high water, full and change, at Pulo Rubia anchorages at IXh. 45m.; springs rise 7 feet, neaps 4¾ feet.

- 25 **Tidal streams.**—The flood, or south-east going stream, increased by the easterly current which prevails northward of Pulo Weh, sets into the strait between Pulo Rubia and the main island at the rate of 3 knots an hour at springs; the ebb is much weaker.

Chart 219, Acheh head to Diamond point. Var. nil.

- 30 **BENGAL PASSAGE or Sawang Pulo Weh**, formed between Pulo Bras and Pulo Weh, is about 11 miles wide and very deep; it is the best approach, for vessels, to Malacca strait from the westward. South-west or north-east winds, according to time of year, always prevail, and are fairly steady.

- 35 Vessels should approach the passage from eastward of North-west islet, to avoid the dangers between it and Pulo Bras; thence as requisite for Olehléh or along the north coast of Sumatra through Malacca passage.

- 40 There is generally a north-westerly current of from one knot to 2 knots an hour through the fairway of Bengal passage; and it is advisable for sailing vessels, working to the south-eastward, to keep near the western shore, where the streams are tidal, and where anchorage

General charts 219, 2760.

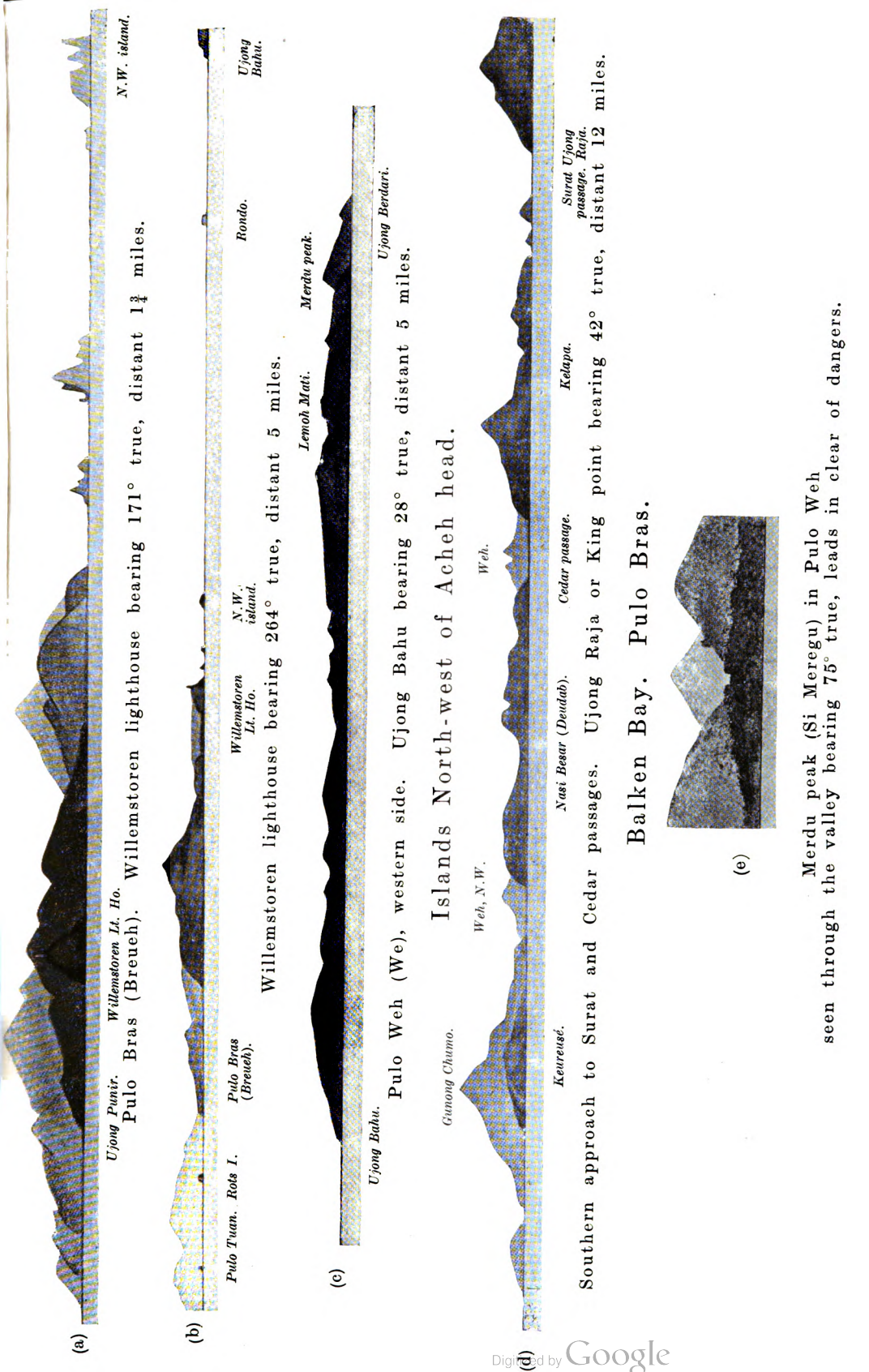


Chart 219, Acheh head to Diamond point. Var. nil.

may be taken if necessary until the flood, or south-east-going, stream makes.

It is the best passage at all times when proceeding westward.

Dangers.—The reef, which extends about 2 cables off-shore southward of Ujong Bahu and Karang Berduri, off the south point of Pulo Weh, are the only known dangers, but they lie near the shore, and have been described on page 50. 5

NORTH COAST of Sumatra.—Aspect.—The coast between Acheh head and Diamond point, about 140 miles in length, is very varied; in places the cliffs rise precipitously from the sea to a considerable height, crowned by dense vegetation; in other portions there are sandy beaches, or cultivated plains reaching to the shore, with numerous villages or kampongs scattered over them. At various distances inland are several mountain ranges, all of which, more or less, follow the direction of the island, with prominent mountain peaks affording ready means for fixing the position of a vessel; many of these peaks are within 12 miles of the coast, and may possibly be recognised by the following description. See views on page 56. 10

Glé Raja, or Paran mount (*Lat. 5° 32' N., Long. 95° 16' E.*), 1,673 feet high, is the highest portion of the range of which Acheh head is the northern extreme. 20

Glé Raja, 5,170 feet high, lies 11 miles south-eastward of that mentioned.

Glé Durung, or Taleue Daroh, 1,037 feet high, lies within and over Pedro point. 25

Glé Gaja, or Tulo Po, 1,430 feet high (not charted), is the highest peak of the chain of hills within Pedro point. These peaks, about 1,000 feet high, are, however, much alike, being thinly wooded and undulating, and form the north-west spur of the Selawa Janten or Golden mountain. 30

Glé Ayer Panas, 984 feet high, has a flat summit, and lies 5 miles south-westward of Batu Putih point; Gunong Eimperusong, or Eum-pee Rutong, with a green summit, lies midway between.

Gunong Melijung, 8 miles south-eastward of Batu Putih point, is dome-shaped, and 1,968 feet high. 35

Selawa Janten or Seulawai Agam (*Lat. 5° 26' N., Long. 95° 41' E.*), known also as Golden mountain, about 4 miles southward of Melijung, is cone-shaped, 6,096 feet high, and visible from a distance of about 80 miles in exceptionally clear weather. 40

Pedir or Weesberg, Selawa Betina, or Seulawai Inong, 3,018 feet high, and 7 miles eastward of Selawa Janten, is easily recognised by its flattened cone, which has a slight depression in the middle.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Close to the coast, and about 4 miles westward of Merdu, is Trengading, a very steep hill, 229 feet high, with a solitary tree on its summit. There are two conspicuous villages near it.

- 5 Glé Tambineh, nearly 12 miles within Merdu, is 4,931 feet high, but not easily identified. Glé Samalanga (Samalang), 4 miles eastward of it, is dome-shaped, and 3,950 feet high.

Glé Punchek (*Lat. 5° 1' N., Long. 96° 27' E.*), 4,872 feet high, 4 miles eastward of Glé Samalang, is a flattened cone not easily
10 recognised.

Bengalang, 5 miles within Ujong Raja or King point, is 951 feet high, with a flattish top.

- Pedada, or Glé Ram, 1,345 feet high, 4 miles southward of Pedada, is steep to the westward, and sloping to the eastward; it is conspicuous,
15 especially when seen from the north-westward, when it appears as a large square horn with steep sides.

Bukit Goh, or Elephant mountain (*Lat. 5° 3' N., Long. 96° 38' E.*), 3,445 feet high, and 10 miles southward of Pedada, resembles an elephant with its head to the westward.

- 20 Glé Lamruja, between Pedada mount and Pasangan hills, is conspicuous.

Pasangan, or Glé Mung Mung, 984 feet high, 5½ miles from the coast, has a thicket on its summit.

- Chunda range (*Lat. 4° 48' N., Long. 96° 49½' E.*), known also as
25 Glé Gardung, 25 miles from the coast, has two craters, shaped like truncated cones, on the east and west sides of the range; the eastern is 9,974 feet, and the western 10,696 feet high.

- Pasai range to the eastward attains a height of 5,335 feet, but has no conspicuous summit. There are no ranges between this and
30 Diamond point, 25 miles to the north-eastward.

About 14 miles south-eastward of the Pasai is Gunong Tumian (*Lat. 4° 44' N., Long. 97° 23' E.*), the summit of which is 5,742 feet high. (Chart 1353.) *Continued on page 76.*

- Winds.—Currents.**—The remarks on winds, currents, tides,
35 and climate of the north coast of Sumatra will be found in Chapter I., pages 23-30.

Plan of Olehléh bay on 219.

- COAST.—Acheh head (Ujong Masam Muka) to Pedro point.**—Acheh head, with Ujong Raja or King point,
40 situated 3½ miles to the south-south-westward of it, form the north-west extreme of the island of Sumatra; both are bluff promontories, and the summit of the peninsula, of which they are a part, attains a height of 1,673 feet in Glé Raja, before mentioned; Acheh head is steep-to at a short distance, with Surat passage close northward of it.

General charts 2760, 70.

Plan of Olehléh bay on 219. Var. nil.

Between Acheh head and Pedro point or Tanjong Datu, are Olehléh and Gigieng bays, separated by the point and spit at Kwala Acheh. The coast at Acheh head, and for about one mile to the eastward, is rocky and steep, beyond which it is sandy for the whole distance to Pedro point; with the exception of Acheh head, which is steep-to, it may be approached by the lead, the bottom being composed of black sand for about 3 miles off-shore, with white sand and shells outside that distance. 5

In places especially near Kwala Gigieng, there are sandhills, within which the land is in great part morass, with but scanty vegetation, but occasionally there are trees of some height. The morass is intersected by creeks and lagoons, with footpaths connecting the several villages which are generally situated on the higher ground. 10

The villages are numerous and are usually surrounded by alang-alang woods, lofty cocoanut trees, or cultivated ground; many are seen from seaward. Kota Raja, the capital of Acheh province, is situated in the valley of Great Acheh, nearly 2 miles inland. This valley has considerable influence on the weather conditions in Olehléh anchorage. 15 20

Kwala Neuji Panchur, the mouth of the lagoon close eastward of Acheh head, has a depth of $1\frac{1}{2}$ feet at low water spring tides, the channel passing within 50 yards of Acheh head. The lagoon is very shallow, and a large village of the same name is on its eastern shore. 25

Pulo Tuan, a small dome-shaped islet, 120 feet high, on the northern extreme of the flat fronting the shore, is in the west part of Olehléh bay, at about three-quarters of a mile eastward of Acheh head, with which it is connected by a ridge of rocks above water in places; there are depths of 5 fathoms to within a short distance northward of the isle, but no available channel between it and the shore except for canoes. 30

Landing may be effected on the south side of the islet, where there is a path leading to its summit on which there is a burial ground.

Kwala Chankul, the mouth of the lagoon, one mile westward of Olehléh, has a depth of $3\frac{1}{2}$ feet at low water spring tides; the lagoon is shallow, but there are passages for canoes leading southward of Olehléh eastward to Acheh river, and westward to Panchur lagoon. Pagani blockhouse (not charted), black with a zinc roof, on the narrow spit of land westward of the entrance, is conspicuous. 35 40

OLEHLÉH (Ulëë Lheuë) (*Lat. $5^{\circ} 33' N.$, Long. $95^{\circ} 19' E.$*), the port of Kota Raja, is situated on the narrow spit of sand which separates Chankul lagoon from the sea at 7 cables eastward of its

General charts 2760, 70.

Plan of Olehléh bay on 219. Var. nil.

entrance. The tramline runs through its centre; there is a European and also a Chinese quarter.

Piers.—There are three landing piers; the western or Government pier, connected with the steam tramway, is fitted with two steam cranes.

Olehléh road.—Anchorage.—The harbour limits are within a line joining Acheh head and the entrance to Acheh river. Olehléh road affords good anchorage in from 4 to 5 fathoms, according to draught, over black sand, and good holding ground, off the piers. A long scope of cable is necessary, and vessels of heavy draught should anchor farther out; a second anchor should be ready. There is a heavy sea at times in both monsoons, and smooth water can only be depended on for a week or two at the change of the monsoons. Vessels should keep steam ready for use at short notice, as the weather is unreliable. *See* views, abreast.

During the south-west monsoon violent gusts blow from the valley southward of Acheh head, and during the north-east monsoon the sea and swell are sometimes so heavy that communication with the shore is interrupted, and the sea almost breaks in 3 fathoms. Land and sea breezes often blow during both seasons, but the land breezes do not extend beyond the islands. The forenoon is generally calm, and the best time for landing, &c. The roadstead is infested by sharks. *See* Winds, &c., page 23.

Directions.—Approaching Olehléh road from the north-eastward, by keeping the perpendicular south fall of the hill, $1\frac{1}{2}$ miles within Acheh head, bearing about 235° true, or southward of that bearing, the shallow water extending off Acheh river and eastward of it will be avoided, but the lead is the best guide.

From the north-westward the approach is by Bengal passage.

From the west coast of Sumatra, coasting steamers and sailing vessels with a fair wind and tide use Cedar and Surat passages; the former is to be preferred. *See* Directions for these passages, previously given. Pulo Tuan and the reef between it and Acheh head should be given a berth when approaching Olehléh anchorage.

Tides.—*See* page 30.

Tidal streams.—The flood or east-going stream setting against the prevailing westerly current is weak; the ebb or west-going stream runs longer and with greater strength than the flood. The mean rate of the flood is half a knot, and of the ebb three-quarters of a knot.

During the south-west monsoon, the streams are weak, and vessels will ride head to wind.

General charts 219, 2760.

(a)

Acheh river,
53° true.

Golden Mountain (*Selawa Janten*).

a

b

Houten head.

Chin head.

c

d

Izseren, 155° true.

e

Flagstaff Camp.

Sabang.

In Olehleh roadstead. Pulo Tuan bearing 260° true, distant 2 miles.

Off Acheh River.

Kelapa.

278° true.

(b)

Acheh Angkasa Batu.
head. Cedar passage.

Nasi Besar or Delap (*Deudab*).

Pulo Bras (*Brench*).

Acheh head to Pulo Bras. Acheh head (Masam Muka) bearing 244° true, distant 10½ miles.

Plan of Olehléh bay on 219. Var. nil.

Communication.—Vessels of the Netherlands Royal Packet Company, leaving Batavia and Padang every fortnight, call at Olehléh, touching at the coast ports, and several steamers trade between Olehléh and Penang. Olehléh is connected with Kota Raja and Kwala Langsar, Segli, Bajan, and various places between, by steam tramways. There is telegraphic and telephonic communication with Kota Raja and other places, and by submarine cable with Deli, Penang, and Sabang bay. See Chapter I., page 18. 5

Supplies.—Fresh beef, poultry, vegetables, bread, &c., are obtainable, and fruits when in season. There is no good drinking water. 10

Hospital.—There is a fine hospital, with 800 beds at Kota Raja.

Trade.—The exports are pepper, betel nuts, gutta-percha, and other gums, rattans, and cocoanuts. The imports are chiefly piece goods and all kinds of provisions. Most of the exports and imports on the north coast are collected and distributed at Olehléh. 15

Kwala Acheh (*Lat. 5° 35' N., Long. 95° 21' E.*).—The mouth of the Acheh river is nearly 3 miles north-eastward of Olehléh; the 3-fathoms contour line, which south-westward of the river mouth is about 3 cables off-shore, extends about one mile off north-eastward of it. The river has its source in the Golden mountain range, flows through the Acheh valley, and is navigable by boats for a considerable distance. The mouth of the river is barred, and it breaks at low water. The river has two channels, which are constantly changing, so that no directions can be offered, but from within the bar craft of 4 feet draught can get up to Kota Raja, the capital, and lesser draughts some distance above. The banks of the river are swampy as far as Jawa village, 2 miles up, and are partly inundated during the rainy season; above the land is higher. See view *b* on page 60. 20 25 30

The river is bridged near Penajung, about 2 miles up, and at Kota Raja, and there is a row of villages on either bank above Kota Raja. Canoe passages connect the river with the Chankul and Gigieng lagoons on either side. In the rainy season large areas are laid waste by the overflowing of the river; at times all the land between Olehléh and the city is under water, so that there can be no traffic except by boats. The native houses, and many of the more recent European buildings are built on piles. 35

Kota Raja, the former residence of the Sultan, lies in the Great Acheh valley. It is the capital of Acheh and its dependencies, and is the residence of the Governor. The old residence of the Sultan is a rectangular building surrounded by a wall and enclosed by a ditch. The river flows through it. The inner quarters are used for the 40

General charts 219, 2760, 70.

Plan of Olehléh on 219. Var. nil.

Governor's residence, military and civil offices, &c. At Neuso, on the south side of the Kraton, the Sultan's residence, is the military camp. The military hospital lies outside the Kraton, whilst the Chinese, 5 Javanese, and other foreign quarters are on the left bank of the Acheh river. In 1905 the population numbered 3,500, of whom 300 were Europeans and 1,000 Chinese.

Chart 219, Acheh head to Diamond point.

Kota Pohama, a military station with a zinc roof, situated near 10 the shore about midway between Kwala Acheh and the mouth of Gigieng lagoon, is conspicuous; landing is easy here in the morning.

Gigieng lagoon (*Lat. 5° 36' N., Long. 95° 25' E.*) lies within the low sandhills extending eastward of Kwala Acheh, its entrance being about 4 miles eastward. It is very shallow, but admits fairly 15 large boats to ply between the military stations of Kota Pohama and Peukan Krung Chut. The 5-fathoms contour line extends $1\frac{1}{2}$ miles seaward of the entrance to the lagoon, and there is a bank, with a depth of 6 fathoms, lying nearly 2 miles northward of its mouth; eastward to Pedro point the 3-fathoms contour line extends from 3 to 20 5 cables off-shore.

MALACCA PASSAGE, 9 miles in breadth, separates Pulo Weh from the north coast of Sumatra, and is the best approach to Olehléh from the northward. Karang Berduri, on the northern shore, has been mentioned with Pulo Weh and Bengal passage. *See* views, 25 abreast.

Pulo Buru, a rocky islet about half a cable in extent, consists mainly of masses of rock and coral; by manuring, a meagre vegetation has been induced to grow, including two cocoanut trees. There is no water on the islet. It lies in Malacca passage, distant $2\frac{3}{4}$ miles from 30 the north-western part of Pedro point, and is fringed by a reef with rocks above water on which the sea generally breaks heavily. Care is necessary in approaching the islet during light winds, as the tidal streams set strongly over the surrounding reef.

LIGHT (*Lat. 5° 41' N., Long. 95° 25' E.*).—A light is exhibited 35 from a white iron framework, 46 feet high, erected on Pulo Buru, near a dwelling-house with black roof. *See* the Light list.

Anchorage may be obtained in a depth of 8 fathoms, over sand, at about three-quarters of a cable, 79° true, or in the same depth at 2 cables, 246° true, from the island.

40 Boats may effect a landing on the east and south-west sides.

COAST.—From Pedro point to Pedir point, a distance of 28 miles in an easterly direction, the hills approach the coast nearly the whole distance, and the flat swampy shore only attains to any considerable

General charts 2760, 70.

Malacca Passage, Southern shore.

Glé Durang.

(a)

Pedro point.

False Pedro point.

Golden mountain.

a

Kenbar woods.

b

c

d

e

f

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Chart 219, Acheh head to Diamond point. Var. nil.

breadth on the west and south sides of Krung Raja bay. Parts of the coast are composed of chalk, or sandstone, and are steep, as at Lubu, Batu Putih, Segi, and Pedir points; elsewhere it consists of sloping sandy soil, and is partly wooded. *See* views of the coast on pages 62, 65. 5

There are several unimportant rivulets, but most of the entrances to them are closed during a prolonged drought.

With the exception of a 4-fathoms patch in Krung Raja bay, and a shoal eastward of Batu Putih, there are no dangers beyond half a mile from the shore. 10

Anchorage.—Vessels should not anchor in less than 8 to 10 fathoms water; the bottom is chiefly rocky, especially off the headlands.

Directions.—A sailing vessel proceeding from Acheh along this part of the coast should keep near the land, as temporary anchorage can generally be obtained. The bank fronting the shore within the 100-fathoms contour line, is fairly steep-to, with westerly and variable currents outside its limits, and calms are more prevalent in the offing than nearer the land. Every advantage should be taken of the land wind, which sets in about 8 or 9 p.m., and continues through the night. 15 20

Tidal streams.—The tidal streams near the shore are regular, but the ebb or west-going stream, being in the same direction as the current, is much the stronger of the two. *See* page 30. 25

PEDRO POINT or Tanjong Batu (*Lat.* 5° 39' N., *Long.* 95° 28' E.), the northernmost point of Sumatra, is a low headland, and may be recognised by the group of casuarina trees growing not far from the beach. The appearance of the coast changes at Pedro point; westward of it it is flat, but eastward it is in places hilly right down to the shore, and maintains this character as far as Pedir point, about 28 miles farther eastward. 30

The principal stream is the Krung Raja, eastward of Pedro point. Unimportant villages lie at the mouths of the several streams. Around Krung Raja bay it is densely populated, but farther eastward it is but sparsely inhabited. The 5-fathoms contour line is more than half a mile off Pedro point, but farther eastward, more especially eastward of Ayer Masin river, the 5-fathoms contour is steep-to. 35

Close to the westward of Pedro point is the entrance to a shallow lagoon, generally marked by surf, and dry at low water. 40

A patch, with a depth of 2½ fathoms, on the edge of the 3-fathoms contour line, lies 4 cables off Ladung creek, south-eastward of Pedro point.

General charts 2760, 70.

Plan of Krung Raja bay on 219. Var. nil.

- KRUNG (Krueng) RAJA** lies between Pedro point and Lubu (Ujong Bateë Kapal) point, a distance of $4\frac{1}{2}$ miles, the mouth of the Raja river being in the south-east part of the bay, with Raja village near it; the entrance to the river is dry at low water. The west and south sides of the bay are marshy, but eastward of the river the coast is a precipitous cliff. Batu Kapal or Rangmanjang, a sandstone rock, lies about 3 cables off Lubu point, with a depth of 3 fathoms in the fairway between. The shores of the bay are fringed by a bank extending to the distance of about 2 cables, and there is a patch, with a depth of 2 fathoms, lying off the edge of the shore reef, at 3 cables south-westward of Lubu point. A reef extends about the same distance north-west from the point. *See view b* on page 62.

- There are two cliffs near Lubu point, both showing white; these are conspicuous, as they are the only cliffs for a considerable distance.

- A coral patch**, with a depth of 4 fathoms, steep-to, and from 10 to 20 fathoms close around, lies in the western approach of Krung Raja bay, at $1\frac{1}{4}$ miles off-shore, with Batu Kapal bearing 114° true, distant $2\frac{1}{10}$ miles, and with Pulo Buru a little open of Pedro point. The patch affords good temporary anchorage, and for that purpose should be approached with the latter marks as given; it is steep-to.

- Anchorage.**—The bay is inconveniently deep for anchorage, and on the west side the bottom is foul, but it is the only anchorage on the north coast that is usually free from swell in both monsoons. The best position is at the head of the bay, in a depth of 17 fathoms, about 3 cables off-shore, with Batu Kapal in line with Lubu point, and the south-west point of Pulo Weh in line with Pedro point.

There is also good anchorage, in a depth of 7 fathoms, eastward of Batu Kapal, with the south point of that islet in line with Pulo Buru.

- Tides.**—*See* Tides, page 30.

Chart 219, Acheh head to Diamond point.

- COAST.**—**Batu Putih** (Lat. $5^\circ 37' N.$, Long. $95^\circ 38' E.$) or White cliff, lying $10\frac{1}{2}$ miles eastward of Pedro point, is formed of chalk and sandstone, falls steeply to the sea, and is easily recognised by a large white patch showing up on green land. At about $1\frac{1}{4}$ miles eastward of the cliff the 5-fathoms contour line is nearly one mile off-shore, with two patches of 3 fathoms within it, and steep-to. Ayer Masin creek (Kwala Ië Nameh), dry in its mouth at low water, lies south from the eastern patch.

- Villages.**—Lampanas or Lam Panai village, large, and surrounded by cocoanut trees, is situated on the coast $4\frac{1}{2}$ miles south-eastward of Batu Putih, and there is a long row of trees eastward of it. Tanjong Segi (Ujong Metale) is a high portion of the coast midway

General charts 219, 2760, 70.

Views of Sumatra North coast. From Eastward and Southward of Ujong Pedir.

Golden mountain,
232° true.

Mount Pedir
or Selawa Betina.

(a)

Tanjong
Blang Raja.

Westward of Ujong Pedir.—Selawa Janten or Golden Mountain bearing 232° true, distant 11 miles.

Tanjong
Seutimp.

Golden mountain.

(b)

Mt. Pedir
or Selawa Betina.

Off Bengalang, south of Ujong Pedir. Golden Mountain or Selawa Janten bearing 275° true.

Pedir
point.

From about 9 miles Eastward of Ujong Raja.

Glé Geureudong.

Glé Goh
(di'antaberg).

Glé Mongmong.

a Glé Goh.

Glé Ran,
200° true.

Off Pedada village. Glé Goh bearing 178° true, distant 11 miles.

Ujong
Raja.

Golden
mountain.

b

Chart 219, Acheh head to Diamond point. Var. nil.

between Batu Putih and Pedir point, and west of it is Luengah village (not charted), on the west side of entrance to Ayer Masin creek.

Rocks.—Three detached rocks, with a depth of about 2 feet at low water, lie just within the 3-fathoms contour line off a point with a group of casuarina trees between Belang Raja and Churu, situated $3\frac{1}{2}$ miles north-westward of Pedir point. The 5-fathoms contour is steep-to along this coast. 5

Ujong Pedir Pidiē or Tanjong Sagi (*Lat. $5^{\circ} 30' N.$, Long. $95^{\circ} 54' E.$*), being the extreme of a range of hills sloping steeply to the sea, is easily recognised; the coral reef fronting it is steep-to, extending half a cable off it, and, at a distance of half a mile, the depths are about 18 fathoms. A lagoon at Luang village lies within the coast at about 2 miles westward of the point. 10

COAST.—General remarks.—From Ujong Pedir to Ujong Raja, a distance of 38 miles, the coast forms an indentation known as Pedir or Pediee bay, which consists of a narrow strip of sandy coast covered by brushwood, with here and there groups of trees. Small fishing villages are scattered along the coast, and within it the ground is swampy, but not far inland it becomes undulating, and is cultivated, fertile, and thickly populated. 20

Kwala Pedir or Segli river is the principal stream on this part of the coast, and between it and Enjung stream, from a half a mile to one mile inland, is a series of thick cocoanut forests, in front of which the land is comparatively bare. Between the Enjung and Pantai Raja streams and at Trengading, 3 miles east-south-east of the latter, the hills approach the coast. Near Pantai Raja, and on either side of the mouth of Enjung stream, are three groups of high trees. 25

Trengading or Trieng Gadeng hill rises immediately over the beach, and is rendered conspicuous by a single tree on its summit. There are two prominent villages near it. 30

Farther eastward, along the coast, is Bengalang hill, 1,027 feet high, with a flat top, and rendered conspicuous by a large tree on it.

Eastward of Merdu point (Ujong Meureudu) the cocoanut trees again approach the coast, until beyond the mouth of Janka Buya stream, where they merge with the low forest land in which lies Samalanga. 35

Landmarks are scarce along the coast, but there are no dangers beyond half a mile off it. The hills inland have been described with the aspect of this coast, on pages 57, 58. See views of the coast, abreast. 40

Depths off-shore.—The shore bank, with less than 3 fathoms water over it, extends about one-third of a mile off in places; in others, as between Ayer Lebu and Beratyan, and between Samalanga and Ujong Raja, the shore is steep-to. 45

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Batu creek is situated about 4 miles south-eastward of Ujong Pedir. About one mile northward of its entrance, and at half a mile off-shore, there is a patch with a depth of $2\frac{1}{2}$ fathoms between the 5 3 and 5-fathoms contour lines.

Bengalang creek, 2 miles south-eastward of Batu creek, has a low water depth of 3 feet in its rather wide entrance. It has several high trees on its right bank, one standing much higher than the others, and two on its left bank, which render it easily recognisable.

10 **Kwala Pedir** (*Lat. $5^{\circ} 23' N.$, Long. $95^{\circ} 59' E.$*).—Kwala Pedir (Pidié), the western mouth of the Pedir river, dries at low water. Segli, the eastern mouth, has two entrances, but the westernmost dries at low water. The eastern entrance has a depth of 2 feet at low water, marked by stakes, but it is subject to considerable alteration 15 both in direction and depth, and at times both the Pedir and Segli river discharge through a common mouth.

Half a mile above the entrance the Segli river is only navigable by canoes. The land is exceedingly fertile, and the population considerable. The river or stream owes its importance to the fact that it 20 traverses a densely populated district. Twenty-four miles up the stream is Keumala Dalam.

Segli or Sigli.—The Dutch station of Segli is at the mouth of the stream, and there are military posts on both sides of it. About one mile from it, connected by a good footpath, is the large village of 25 Pedir, and an old ruined Portuguese fort.

Supplies of fresh provisions and water in small quantities may be procured.

Communication.—The Netherlands Royal Packet Company's steamers running between Batavia and Penang call here fortnightly; 30 there are also trading steamers between Olehléh and Penang. The steam tramway from Kota Raja runs to Segli. See Chapter I., page 17.

Anchorage.—There is good but open anchorage, in depths of from 8 to 11 fathoms, at about one mile off the coast in the neighbour- 35 hood of Kwala Segli.

Tides.—See page 30.

Tidal streams.—In the bight between Pedir point and Gighen, the streams are regular, but weak; the flood running to the eastward and ebb to the westward.

General charts 2760, 70.

Plan of Gighen road on 219. Var. nil.

Kwala Gighen (Gigieng) is an insignificant stream at 3 miles south-westward of Kwala Segli. There is a fishing village on the western side of the entrance. Gighen village is 2 miles up stream. The shore can be approached by the lead. 5

Chart 219, Aceh head to Diamond point.

Burung village, about 2 miles south-eastward of Gighen, is of some importance as a trading station; its creek dries at low water, and on the left bank are two conical-shaped casuarina trees.

Ayer Lebu or Kwala Iö Leubeuö is the mouth of Tiro 10 river, and has a depth of one foot in its entrance at low water; it extends for some miles inland, and is much used for inland trade by boats. Its mouth may be identified by a few cocoanut trees a little eastward of it, and a portion of the coast near it appears from the offing as a long, sandy, bare promontory. 15

Anchorage.—There is anchorage off Ayer Lebu, in from 8 to 10 fathoms water, but the shore is steep to eastward of the river.

Kwala Enjung (Njong), the mouth of the Teupin Raja (Lat. $5^{\circ} 17' N.$, Long. $96^{\circ} 6' E.$), of some importance to trade, is situated about 4 miles eastward of Ayer Lebu; its entrance has a 20 depth of about 3 feet at low water; it trends westward parallel to the coast within its mouth, and there is a least depth of 4 feet to Enjung or Njong village, situated about 2 miles within the entrance, but near the coast. The left bank of the river is sandy and thickly overgrown with brushwood. 25

A row of lofty trees is situated near the beach westward of the entrance, and to the eastward a chain of hills, covered by pepper plantations, reaches nearly to the shore.

Supplies.—Small supplies of provisions may be procured at the village. 30

Anchorage, in a depth of 8 fathoms, may be obtained off the river with the western side of the ridge of hills in line with two trees at the river mouth.

Depths off-shore.—The bottom seaward of the entrance deepens gradually to 10 or 12 fathoms at half a mile off-shore. 35

Pantai Raja, close eastward of the Enjung range of hills, dries at low water, and 3 miles south-east of it is the Trengading, but neither of these streams is of any importance, both dry at low water. Pantai Raja village is about one mile up the river of same name.

Merdu point (Ujong Meureudu) (Lat. $5^{\circ} 15' N.$, Long. $96^{\circ} 16' E.$), 40 lying 26 miles east-south-eastward of Ujong Pedir, is low and sandy, with a few small trees; a run of water resembling, when at a distance,

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

a path in the valley, is conspicuous during the rainy season. A grove of trees is situate $1\frac{1}{2}$ miles to the westward of the point.

The 5-fathoms contour line is distant about one mile from the point.

5 **Merdu village** is about a third of a mile from the sea on the banks of the small stream of the same name, which has a depth of one foot on the bar at low water and from 4 to 8 feet inside; its banks are marshy, with mangroves and nipa palms. Eastward of the stream the coast is covered with cocoanut trees, which continue along the
10 coast to beyond Olim river. The steam tramway passes through Merdu.

Kwala Olim (Ulim), at about 2 miles eastward of Merdu point, makes a considerable break in the cocoanut trees, being half a cable wide in its entrance, and therefore easily recognised. It usually has
15 two entrance channels, with depths of 4 feet in each at low water, but they are constantly altering; inside, however, there are depths of from 4 to 5 fathoms in places. Olim village, which is small, is situated one mile from the mouth. Meunasa Blang village is 4 miles up river.

Samalanga river has a depth of one foot in its entrance at
20 low water, and depths of from 2 to 3 feet, with a breadth of about 50 yards, as far as Samalanga village, one mile inside the entrance. It rises in Glé Punchuk, and its water is fresh almost down to the mouth. The outlets of the lagoon eastward of Samalanga are dry at low water. Very heavy seas get up off the entrance during the easterly
25 monsoon, rendering anchorage off it untenable.

Communication.—The vessels of the Netherlands Royal Packet Company call off Samalanga at uncertain intervals, and also vessels trading between Penang and Olehléh. Telephonic communication with Kota Raja.

30 **Anchorage.**—The anchorage off Samalanga is in from depths of 12 to 15 fathoms at one mile off-shore.

COAST.—General remarks.—The coast from Ujong Raja to Krung Kukus river, a distance of 36 miles, is low, sandy, and wooded, with higher land a little within it, as described with the aspect of the
35 north coast, page 57. Between Ujong Pedada and Ujong Pasangan the low stretch of plain is covered with stretches of grass, interspersed by groves of trees. There is a row of lofty trees on either side of Krung Kukus river, giving the land the appearance of a promontory; the marshy land traversed by lagoons which lie within the shore is only
40 a narrow strip. See views on page 65.

There are many villages along the coast, giving it a prosperous appearance, but good landmarks are scarce; the promontories are all low and not so sharply defined as those westward of Ujong Raja.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. nil.

Between Ujong Pasangan, and nearly to Krung Kukus the coast bank extends nearly half a mile off, but from the latter, for some miles eastward, the coast is steep-to, and should not be approached within a depth of 10 fathoms; the bottom is chiefly hard sand and small stones, with coral in places, and the holding ground is indifferent. 5

UJONG RAJA (*Lat. 5° 14' N., Long. 96° 28' E.*), a low promontory, may be recognised at some distance by a grove of high trees near its extremity; there is a depth of 5 fathoms near it, but it should not be approached to less depth than 8 fathoms, or within the distance of half a mile. Red rocks, so named on account of their colour, lie one mile south-eastward of Ujong Raja. 10

Patch.—At $2\frac{1}{2}$ miles east of Ujong Raja, a coral patch, of small extent, with a depth of $4\frac{1}{4}$ fathoms, and steep-to, lies 2 miles off-shore, with Glé Bengalang bearing 225° true, distant $5\frac{3}{4}$ miles. 15

A rock, awash at low water, lies $1\frac{1}{4}$ miles south-eastward of Ujong Raja, at about 3 cables off the Red rocks, with shallow water seaward of it; the 5-fathoms contour line passes about a mile off-shore between Ujong Raja and Ujong Pedada.

Ujong Pedada, $6\frac{1}{2}$ miles eastward, and the east extreme of the bay between, is low, and not easily recognised from the offing; a patch of jungle marks it. The water deepens suddenly outside the 5-fathoms contour line. Pedada stream, the mouth of which is a mile eastward of the point, is navigable for boats, and the village lies on its right bank near the coast. 20 25

Jempa village is situated about 4 miles eastward of Ujong Pedada; it and its stream are of no importance.

Two coral patches, with depths of $3\frac{1}{2}$ and $3\frac{1}{4}$ fathoms over them, lie 8° true and 32° true, distant $1\frac{1}{4}$ and $1\frac{1}{2}$ miles, respectively, from Jempa, and outside the 5-fathoms contour line; the bottom round these reefs is sand and shells. 30

Glé Bengalang well open of Ujong Pedada, bearing 250° true, leads seaward of them.

Doi stream, which enters the sea $6\frac{1}{2}$ miles eastward of Jempa village, has a low water depth of 3 feet on the bar and 6 to 8 feet inside; a bank on which the sea breaks extends a short distance north-eastward of the mouth, and a village, conspicuous from seaward, stands on the left bank of the river. The shore here is low and sandy, and the 5-fathoms contour line is $2\frac{1}{2}$ cables off. 35

Ujong Pasangan (Peusangan), situated 22 miles eastward of Ujong Raja, is low and sandy, and may be recognised by several dwarfed casuarina trees on it. The 5-fathoms contour line is 3 cables 40

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

off, beyond which the water deepens rapidly to 30 fathoms at one mile distant. See views of the coast, abreast.

- Kwala Pasangan** (Peusangan) (*Lat. $5^{\circ}17' N.$, Long. $96^{\circ}50' E.$*)
 5 rises in the Laut Tawab, and has two entrances; the eastern, which discharges at Ujong Pasangan, has a low water depth of 3 feet, but it is constantly altering; the depth is about the same in the lagoon within, but farther inland it is much shallower.

- Jangka, the west entrance, has about 2 feet at low water in its
 10 entrance, and joins the main branch about 3 miles up. Jangka village is situated on the left bank.

Anchorage.—Good anchorage may be obtained in from 6 to 7 fathoms water, at half a mile from the coast.

- Kualas Cheurape** and Lapang are mouths of the Blang Me.
 15 **Kuala Mane** is the mouth of the Sawang. They discharge into the bight of the coast between Ujong Pasangan and Agam Agam.

- Rocks.**—**Ujong Agam Agam** is a very slight projection of the coast 8 miles eastward of Ujong Pasangan, nearly three-quarters of a mile off which the Karang Agam Agam, two reefs, with 6 feet
 20 water over them, lie just within the 5-fathoms contour line; they are steep to on their seaward side. Mount Pasangan (Glé Mongmong), bearing 236° true, leads seaward of them.

- Anchorage.**—In the bight between Ujong Pasangan and Agam Agam good anchorage may be obtained in depths of from 5 to
 25 7 fathoms.

- Krung Kukus** (Kwala Lanchang) (*Lat. $5^{\circ}15' N.$, Long. $97^{\circ}4' E.$*).
 —The mouth of the river of that name is easily recognised by the groups of dark casuarina trees standing on either side of it. It is of
 30 some importance, has a low-water depth of 2 feet, and there is about the same depth to a village, one mile up. Above this the depths are from 2 to 3 fathoms, and on the left bank are sandhills about 24 feet high, whilst the opposite bank is covered with thick brushwood, and in some places dense jungle.

- Shallow passages lead through the lagoons to Bungkas stream, to
 35 the westward, and to Telok Semawi to the eastward, from abreast the village. The mouth of the Bungkas dries at low water.

Anchorage.—Good anchorage may be obtained, in 10 fathoms water, abreast, or a little eastward of, the mouth of Krung Kukus. Tides, see page 30.

- A patch** of 7 fathoms, with no soundings around it, is charted
 40 55° true, distant $4\frac{1}{2}$ miles from the mouth of the Krung Kukus; (not on Dutch charts).

From off Pasangan to Agam.

Glé Geureudong.



*Ujong
Pasangan.*

Glé Geureudong.

a



*Glé Mongmong,
187° true.*

Glé Goh.

Glé Ran.

Glé Banggalang.

Ujong Raja.

*Goudberg,
278° true.*

Off Janka village. Ujong Raja to Ujong Pasangan. Glé Goh bearing 213° true, distant 16½ miles.

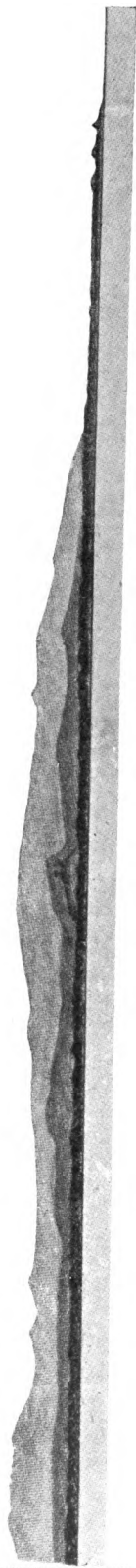
Glé Geureudong.



*Agam Agam,
88° true.*

Glé Geureudong.

a



*Glé Goh & Glé Mongmong,
227° true.*

*Pasangan.
281° true.*

Ujong Pasangan to Agam Agam. Glé Goh bearing 227° true, distant 20 miles.

Chart 219, Achek head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

COAST.—General remarks.—From Krung Kukus to Jambu Ayer or Diamond point, a distance of 27 miles, the coast forms a deep bight, the western part of which is known as Telok Semawi. The shore is sandy, backed by a narrow strip of swampy forest land, within which, at about one mile distant, it becomes hilly. The hilly range, which trends south-eastward, begins at Mamplan hill, 4 miles north-west of Telok Semawi, which hill is rendered conspicuous by a solitary tree on its summit. Eastward of Chunda the hills recede from the coast in a south-east direction, and the extensive plain begins, which is widest at Diamond point, and extends all along the east coast of Sumatra. The Kertei and Jambu streams, which, with their tributaries, irrigate a wide tract of land, enter the sea on this coast. Several groups of trees near the coast offer good landmarks, as charted. See also views of coast on page 70.

Pulo Semawi, about 4 miles in length by one in breadth, is marshy and unproductive, it closely adjoins the mainland, being separated by Kwala Mamplam. Its eastern side is steep-to.

Kwala Mamplam.—Its western entrance, situated about $4\frac{1}{2}$ miles eastward of the Krung Kukus, has a depth of one foot at low water, with depths of 2 fathoms in places inside. Its banks are swampy, with villages here and there, amongst which are those of the chiefs of Semawi and Chunda. Kwala Mamplam communicates with the Krung Kukus by swampy and shallow passages, available only for canoes, and also with Telok Semawi.

Barat Laut, the north-east extreme of Pulo Semawi, is a sandy promontory easily recognised by the high trees just within it. The point is steep-to, with depths of from 15 to 20 fathoms at a short distance.

Dangers.—The shore between Krung Kukus and Telok Semawi is steep-to, there being a depth of 10 fathoms a short distance from it, but thence eastward to Jambu Ayer, a sandbank fronts the shore, and the 3-fathoms contour line, generally about one mile off, is, when to the northward of Changkul, and north-westward of Diamond point, from 2 to $2\frac{1}{2}$ miles from the coast, and has on it several shallow coral patches. Patches also lie outside the 10-fathoms line.

Karang Pare, with a depth of 2 fathoms, lies about 2 miles, 330° true, from the trees at Changkul; the 3-fathoms contour is one mile north-eastward of this shoal. There is a patch of 2 fathoms between the 3 and 5-fathoms contour lines, at $1\frac{1}{2}$ miles north-eastward of Pidada trees.

Karang Bada, with a depth of 6 fathoms, over coral, is situated 4 miles from the coast, with Changkul bearing 160° true.

General charts 2760, 70.

Chart 219, Acheh head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

Karang Tenga (*Lat. $5^{\circ} 18' N.$, Long. $97^{\circ} 23' E.$*), a coral reef with a depth of $2\frac{3}{4}$ fathoms, and from 12 to 14 fathoms around, lies 5 miles off-shore, with Jambu Ayer point lighthouse bearing 100° true, distant 5 $7\frac{1}{4}$ miles.

Minjak, a patch with a depth of 6 fathoms, and 15 to 20 fathoms around, lies about $1\frac{3}{4}$ miles, 325° true, from Karang Tenga. The bottom, near the shore, is sand, and a short distance off it is sand mixed with mud and coral, whilst in the offing it is clay and mud.

- 10 Under favourable circumstances the last three dangers are marked by tide-rips.

Karang Timau, awash at low water, is surrounded by depths of from 7 to 8 fathoms, and lies about midway and a little eastward of a line joining Karang Tenga and the solitary tree on the shore.

- 15 **Buoy.**—Karang Timau is marked, on its northern side, by a black can buoy, surmounted by a truncated cone, in about 10 fathoms.

- TELOK SEMAWI**, the bay between Pulo Semawi and Krung Kertei, is 7 miles wide, and fronted by a bank with less than 3 fathoms water to about a mile off-shore. Telok Semawi may easily be recognised by the hills, a remarkable ridge, 500 feet high, at about 2 miles west of Chunda village; these hills are cleared of trees, and the light green grass renders them distinguishable.

- LIGHT** (*Lat. $5^{\circ} 18' N.$, Long. $97^{\circ} 10' E.$*).—A light is exhibited on New Barut Laut, the north-east point of Pulo Semawi, north-west approach to Telok Semawi, from a white iron framework, 42 feet in height. See the Light list.

- Anchorage.**—Excepting Krung Raja this is the only anchorage on the north coast of Sumatra affording protection from the open sea. It is well sheltered during the south-west monsoon, but is 30 not roomy, and the depths increase rapidly off-shore. At times during the north-east monsoon fresh breezes against the tide cause a nasty sea to vessels at anchor in the road. There is anchorage in about 8 fathoms at $1\frac{3}{4}$ miles northward of Lanchang, and farther eastward at 2 miles northward of the Kertei trees, in about 6 fathoms.

- 35 Vessels from the eastward should approach it from northward of Karang Tenga; local small craft can go between Karang Timau black buoy and the coast, passing well northward of Karang Pare.

- Semawi (Seumawé) town**, a Dutch military station on the south-east extreme of Pulo Semawi, the capital of the northern division of Acheh, and the residence of a Controller, is an important port 40 for the inland trade, owing to the good boat harbour in the southern entrance to Kwala Mamplam and the inland communication by that

Chart 219, Aceh head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

creek to Krung Kukus, thus avoiding the sea passage to that river during the north-easterly monsoon period, when it is dangerous for very small craft; the entrance to the river or creek has a depth of 3 feet on its bar at low water.

Communication.—The Netherlands Royal Packet Company's steamers, running between Batavia and Penang, call here fortnightly, and there are occasional steamers between Olehléh and Penang. There is a station of the steam coastal tramway here. *See Chapter I.*

Supplies.—Fresh provisions and water may be obtained at Semawi.

Pier.—There is a pier on the south-east side of Pulo Semawi, but loading and discharging is difficult here at times.

COAST.—**Kwala Meraksa** (Meurasa) (*Lat. $5^{\circ} 10'$ N., Long. $97^{\circ} 10'$ E.*) enters Telok Semawi, and has a least depth of 2 feet on its bar, with from one fathom to 2 fathoms within for some distance. The village of same name lies on the right bank, near its mouth, and that of Baju about 2 miles up.

Krung Pasai lies 4 miles eastward of the Meraksa, and has a least depth of 2 feet in its entrance. Its mouth is distinguished by two trees. Gedong village, a station of the tramway service, is situated about 2 miles up stream; craft of 3 feet draught can reach there, but the channel is tortuous.

Krung Kertei (Keureutu), about $7\frac{1}{2}$ miles eastward of Semawi, is a rapid fresh-water stream rising far inland, and its mouth, 150 yards in width, is easily recognised by two lofty trees rising conspicuously about the brushwood; here the banks are low and covered with brushwood, and there are some villages. *See views a and b, on page 74.*

Farther up the banks are higher; at Belang Puoi (Keureutsē), on the right bank, about 4 miles up, they are from 5 to 6 feet above high water, and for a distance of 7 miles the width of the river is not less than half a cable. The country in the vicinity is thickly populated, and the land under cultivation. The bar of the river has a low-water depth of 2 feet, and with the exception of a bar with 6 feet abreast Lapang (Nibong), a little above the entrance, the depths are from 2 to 5 fathoms. Craft of 6 feet draught can enter.

Kwala Changkul (Changkoj) eastward of the Kertei, is marked by trees, as charted.

Krung Pidada, nearly 4 miles eastward of the Kertei, has also a low-water depth of 2 feet in its entrance, and may be recognised by a conspicuous grove of trees close to it. There are depths of from 3 to 4 fathoms in the river, between banks of mangroves.

General charts 2760, 70.

Chart 219, Aceh head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

Sungi Jambu Ayer (Aye) takes its rise at a considerable distance in the interior, enters the sea at about one mile westward of the point of the same name, and separates the province of Kertei from that of Simpang Olim. It is about half a cable wide in its entrance, with a low-water depth of 3 feet, but the bar is usually breaking at that time; it is subject to change. Steam vessels of 4 and 5 feet draught can ascend for about 16 miles; it is not, however, easily navigated, as there is always a strong downward current, with many snags in the rainy season, and the channel is tortuous. Discoloured water, from the river, sometimes extends for a distance of 4 miles from the mouth.

The banks of the lower portion of the river are low and swampy, and overgrown with mangroves; above they gradually grow higher, and the vegetation becomes more luxuriant, with many villages, pepper gardens, &c. Above Baba Lung, about 20 miles up, the banks are about 25 feet above the river, and overgrown with bushes.

The river is not much used by the natives for trade purposes, owing chiefly to its shifting and dangerous bar. Produce is generally taken through an artificial canal to the Simpang Olim for shipment.

JAMBU AYER (Aye) or DIAMOND POINT is a sandy promontory just above high water, within which are a few casuarina trees; the coastline seems to be slowly receding. See views, abreast.

LIGHT (*Lat. $5^{\circ} 17' E.$, Long. $97^{\circ} 28' E.$*).—A light is exhibited from a brown screw pile structure, 79 feet high, with white dwelling, erected in a depth of 9 feet off Jambu Ayer. See the Light list.

Spit.—A spit, with depths under 3 fathoms, extends from the point to about one mile north-westward of the light; it is somewhat steep to on its eastern side, over which the sea breaks in places. The 5-fathoms contour line is $2\frac{1}{4}$ miles north-west of the light; discoloured water has been reported about the same distance northward of it, probably caused by detritus from the river, but vessels should not approach the spit to a less depth than 10 fathoms, especially during the north-east monsoon, when a heavy swell will be experienced.

Tides.—It is high water, full and change, at Jambu Ayer, at noon; springs rise 9 feet. The tide is felt up to Tepin Kujon, about 2 miles above the entrance of the Sungi Jambu Ayer.

Tidal streams.—The flood stream sets south-east, and the ebb north-westward, but between Jambu Ayer and the Aroa islands the set varies a point or two according to the direction of the coast. The ebb, being increased by the prevailing north-westerly current, is stronger and of longer duration than the flood, and at springs some-

General charts 2760, 70.

Sumatra, North-east extreme.



*Diamond point
(Lt. Ho. not shown).*

Pase hills.



Piadan.

Kertei River to Diamond point.

Kertei river.



Pari Busuk.

*Diamond point
(Lt. Ho. not shown).*

Jambu R.



Jambu R.

Off Diamond point, or Jambu Ayer.—Pidada (Piadah) to Pari Busuk (Buso). Diamond point bearing 188° true, distant 3 miles.

Pidada.

Simbuang mountains.



(c)

Mouth of river.

Sungi Simpang Olim (Ulim) mouth bearing 200° true, distant 2 miles.

Chart 219, Acheh head to Diamond point. Var. $0\frac{1}{4}^{\circ}$ E.

times attains a rate of 3 knots an hour, but when the distance from the shore is considerable it seldom exceeds $1\frac{1}{2}$ knots.

Near the coast westward of Jambu Ayer the tidal streams are weak.

GENERAL DIRECTIONS.—The north coast of Sumatra can almost everywhere be approached to a depth of 12 fathoms, since all dangers lie within that limit. The only exceptions are the dangers westward of Jambu Ayer or Diamond point, and the 4-fathoms patch in Krung Raja.

Sailing vessels rarely make a quick passage along this coast, but as a rule progress westward is greater than when proceeding eastward, on account of the westerly current.

Vessels are recommended to let go a stream anchor, and wait when wind and tide are against them. *See* Tides, page 30.

Sailing vessels bound eastward along the coast during the easterly monsoon should keep near the shore; calms and light winds are generally met with at any distance off, whilst near the coast regular land and sea breezes may be depended on. In addition, at some distance off-shore, there is a constant current to the north-westward, whilst in-shore the tidal streams may be utilised, and at night the land wind, which blows from a southerly direction for about 2 hours after sunset. January and February are the most unfavourable months for proceeding eastward, as the north-east monsoon is then at its strength.

Proceeding eastward, during the south-west monsoon, it is not advisable to go beyond 40 miles from the coast. Vessels should, if bound through Malacca strait, get as soon as possible to the eastern shore, if obliged to beat.

In this monsoon, at times, there are persistent south-easterly winds, under which circumstances it would be better to hug the shore, to take advantage of the land and sea breezes.

October is the best month for a sailing vessel bound eastward, as north-westerly winds can then be reckoned on.

For winds and currents, *see* Chapter I., pages 23-29.

General charts 1353, 2760, 70.

CHAPTER III.

MALACCA STRAIT, WESTERN SHORE—*continued.*JAMBU AYER OR DIAMOND POINT TO THE KARÍMUN ISLANDS,
IN THE WESTERN APPROACH TO SINGAPORE STRAIT.

VARIATION IN 1915.—Decreasing $1\frac{1}{2}$ minutes annually.

GENERAL REMARKS.—Abreast Jambu Ayer or Diamond point, described at the end of the last chapter, Malacca strait is reduced to a breadth of about 165 miles, between that point and Pulo Penang, tapering within; to the south-eastward. Pulo Perak, 394 feet
5 high, lies in the fairway between, at about 20 miles northward of a line joining them, and makes a good landfall.

The eastern, or Sumatra shore, will be continued to the Karimun islands, where Malacca strait joins Singapore strait, followed by the western shore, formed by the Malay coast, from Salang or Junkseylon,
10 island to Tanjong Bulus, abreast the Brothers and Karímun islands.

Chart 1355, Malacca strait.

EAST COAST OF SUMATRA.—**Aspect.**—The land between Jambu and Ayer or Diamond point, and Tanjong Tamiang presents from the offing one uniform stretch of high woodland, with
15 scarcely any perceptible interruptions. Inland is a chain of mountains trending south-south-eastward, a continuation of the chain in the northernmost part of Acheh. See view on pages 74, 80, 83, 87.

Gunong Tumian, or Temin of Semuang (*Lat.* $4^{\circ}44'N.$, *Long.* $97^{\circ}23'E.$), 5,742 feet high, is the northernmost portion which can be distinguished;
20 it lies about 25 miles from the coast and is only visible in clear weather, but its rounded tops render it useless as a mark; referred to also on page 58.

Chart 1353, Diamond point to Pulo Berhala.

In the parallel of Tanjong Tamiang, a spur of this range comes within
25 6 miles of the coast with two recognisable summits, namely, Tamiang, 394 feet, and Flat hill, 509 feet. Near Edi Rajut and Pedowa, to the northward, also, the hills approach the coast.

Pedowa hills (*Lat.* $4^{\circ}53'N.$, *Long.* $97^{\circ}48'E.$) are situated near the parallel of Perlak; they are low and rounded hills, and the highest is
30 distinguished by a leafless tree on its western declivity.

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala.

Kwala Edi Rajut can be distinguished by the masts of the many small vessels usually lying there, and possibly by the Pedowa hills, 7 miles to the south-eastward.

A waterfall (*Lat.* $4^{\circ} 24' N.$, *Long.* $97^{\circ} 41' E.$), appearing as a light streak on the mountain side, at a height of 2,887 feet, is visible off and southward of Langsar. View *b* on page 83. 5

The land within the sandy strip of shore is mostly low and swampy and covered with mangroves; at the mouths of the streams there is generally more sand, and these spots are marked by casuarina trees. 10

A sand and mud bank, with depths of from one fathom to 3 fathoms over it, fronts the shore to a considerable distance in places; beyond it the bottom is mud, or sand and mud.

Rivers.—A number of streams or small rivers flow through the coastal lands, each bearing the name of the district through which it passes. 15

The principal are the Simpang Olim, the Arakun-Dur, Edi Rajut, the Perlak, Langsar, and Tamiang, and there are several creeks intersecting the swamps; many of them dry at their entrances at low water, and are subject to considerable change. The depths in the smaller streams given in the following pages are old, and are not to be found in the Dutch sailing directions, but they afford some sort of a guide. 20

Owing to the nature of the land the country is thinly populated; the inhabitants are mostly fishermen, and their villages are usually at the mouths of the several streams, and not conspicuous from the offing. 25

Tides.—The double daily springs occur along this coast at about two days after full and new moon, with high water at noon, and a rise of about 5 feet. Neaps occur two days after the moon's quadrature, with high water at VIh., and a rise of $1\frac{1}{2}$ feet.

Single daily high water occurs on 1st January, at VIIh. p.m., and on 1st April, at Ih. p.m., 1st July at VIIh. a.m., 1st October Ih. a.m.; springs occur at moon's greatest declination, with a rise of $1\frac{1}{2}$ feet; neaps occur when declination is nil, with a rise of 6 inches. The highest water levels occur in mid-April and mid-October, at noon and midnight, respectively. The streams in the offing are largely affected by the wind, but the set north-westward is the prevailing one. Nearer the shore the flood or rising tide sets north-westward, and the ebb south-eastward, at a rate of about $1\frac{3}{4}$ knots, and near the shore at about 2 knots; in the mouths of the rivers the stream is at times about 3 knots, but depending on the width of the entrances. 35 40

Winds.—Regular land and sea breezes are experienced on this part of the coast in February, March, and April, the latter portion of the north-east monsoon. See also page 23.

General chart 1355.

Chart 219, Acheh head to Diamond point. Var. $0\frac{3}{4}^{\circ}$ E.

During the strength of the north-east monsoon this coast should be given a wide berth by a sailing vessel, there being usually a heavy swell rolling on it at that season.

5 **COAST. — Pari Busuk (Pari Buso) and Ringin** (*Lat. $5^{\circ} 13' N.$, Long. $97^{\circ} 32' E.$*).—Between 3 and 6 miles south-eastward of Jambu Ayer are Pari Busuk and Ringin, two low sandy islands, covered by lofty casuarina and other trees, situated within the edge of the mudbank, and separated by a shallow lagoon from the
10 coast; the islands are conspicuous from the offing.

The 5-fathoms contour line, passing about a mile eastward of the islands, is fairly steep-to.

Sungi Rusa, debouching just southward of Pulo Ringin, communicates with Sungi Jambu Ayer at Babalung village, up to which it
15 is navigable for craft of 4 feet draught. The banks are swampy near its mouth, but farther up there are scattered villages on higher cultivated ground.

Sungi Belas, southward of, and communicating with, Sungi Rusa, is navigable for craft of 4 feet draught; it also communicates
20 with Sungi Jambu Ayer.

A patch with a depth of 5 fathoms, just within the 10-fathoms contour line, lies $1\frac{3}{4}$ miles north-eastward of Sungi Belas.

Plan of Simpang Olim creek on 219.

Sungi Simpang Olim (Ulim), situated 9 miles south-eastward of Jambu Ayer, is one of the deepest on this coast. It has a depth
25 of 10 feet on its bar at high water spring tides, and from 2 to 4 fathoms within, as far as the Rusa branch, and the banks are swampy, with many creeks discharging through them; the village of Simpang Olim is situated on higher ground about 6 miles above the entrance. The
30 channel over the bar is marked by stakes, and is subject to considerable change. The bank fronting the river, with depths of less than 3 fathoms, extends about one mile off, and the 5-fathoms contour line is $1\frac{1}{2}$ miles from the shore. See view c on page 74.

Tides.—Springs rise about 6 feet.

35 *Chart 219, Acheh head to Diamond point.*

Steile or Steep point, 2 miles south-eastward of Simpang Olim, is a low sandy tongue, with a thick casuarina wood, which from the offing appears like a steep headland; hence its name. It may be approached by the lead. See view a on page 80.

40 **Malihan river**, close southward of Steile point, has a depth of 7 feet at high water in its entrance, with a greater depth within, the water discharging into it from many creeks from the morass around; it is of no importance.

General charts 1219, 1353, 1355.

Plan of Arakun Dur on 219. Var. $0\frac{3}{4}^{\circ}$ E.

Sungi Arakun Dur (Ara Kundo) (*Lat. $5^{\circ} 6' N.$, Long. $97^{\circ} 38' E.$*), $1\frac{1}{2}$ miles south-eastward of the Malihan, is, for small craft, one of the most important on this coast, being broad, straight, and easy to navigate. There is a depth of 10 feet on its bar at high water spring tides, close along the northern point of entrance, and ample room within for vessels that can enter, there being from 2 to 6 fathoms water for some distance. 5

Vessels of 6 feet draught can ascend to Arasan Belu island, just above which there is a bar with a low-water depth of 6 feet. Boats can reach Semantoh; some distance above this it connects with the Jambu Ayer. 10

The banks of the river are swampy nearly up to Telok Sintang village, where there is a small supply of good well water. Above this the ground becomes higher and the wooded land is interspersed with pepper plantations. At Teping Kuleh, just above Sintang, there is a fresh-water stream. 15

Tides.—Springs rise 6 feet.

Chart 219, Aceh head to Diamond point.

Sungi Julok (Julo Rajeu), 2 miles southward of Sungi Arakun Dur, has a depth of about 10 feet at high water spring tides, on its bar; craft of 5 feet draught can ascend to Rantau Panjang village, above which it is narrow; it is no great distance beyond to Julok Besar village. Its entrance is said to be marked by stakes. 20

Glumpang village, surrounded by cocoanut trees, lies within the entrance with a swamp behind it. 25

The Bugging, Baga, and Edi Chut rivers to the south-eastward are dry at low water and of no importance. The ground near them is all swampy.

Plan of Edi Rajut on 219.

SUNGI EDI RAJUT (Idi) is winding and from 20 to 30 yards in breadth, with a depth of about $1\frac{1}{2}$ feet on its bar at low water spring tides, but it is subject to change; the channel is marked by stakes, and small trading craft ascend to Idi or Edi village, about 3 miles up. The Custom-house is on the right bank at the mouth, from whence there is a good bridle path to Edi, and there is a fishing village on the left bank. 30 35

LIGHT (*Lat. $4^{\circ} 58' N.$, Long. $97^{\circ} 45' E.$*).—A light is exhibited from a white iron framework tower, 70 feet high, with a dwelling at its base, and situated at the entrance to Sungi Edi Rajut. See the Light list. 40

Edi (Idi) is one of the most important places on the east coast of Aceh, and is the Controlleur of the sub-division of Edi. See view *b* on page 80.

General charts 1353, 1355.

Plan of Edi Rajut on 219. Var. $0\frac{3}{4}^{\circ}$ E.

Communication.—Fortnightly by steamers, *viâ* Deli to Singapore, and to Penang and Batavia; vessels trading between Olehléh and Penang also call here.

5 **Supplies.**—Small supplies are obtainable, but water is scarce.

Trade.—Edi is an open port, and represents the centre of the east coast trade, which is chiefly in the hands of Penang merchants. The exports are pepper, gutta percha, wax, rattans, and hides. The imports are provisions, petroleum, hardware, and agricultural imple-
10 ments. *See view b, abreast.*

Anchorage.—Anchorage may be obtained off the river in 5 fathoms water, with the Custom-house bearing 236° true, distant $1\frac{1}{2}$ miles, but it is exposed during the north-east monsoon, and communication with the shore is at times impracticable. There is anchorage in $4\frac{1}{2}$ fathoms, with the mouth of the river bearing 224° and
15 Steile point 312° true. The masts of the small craft in the river serve to identify it from the offing. There is also a pair of oblong hills of a yellowish colour close over the coast, rising above the trees, and above the tree of Edi, which stands on a fairly high hill in the
20 neighbourhood; it must not be confused with a similar tree in the Jingki district to the southward.

Tides.—Springs rise about 6 feet.

Chart 1353, Diamond point to Pulo Berhala.

25 **Pedowa or Peudawa Kechil, and Pedowa or Peudawa Besar** are two shallow streams, navigable, by boats only, to the villages of like names on their banks.

Ujong Perlak (Tanjong Peureula), situated about 32 miles south-eastward of Jambu Ayer or Diamond point, is a low and sandy point covered with tall trees, which, with the Pedowa hills 4 miles
30 within, render it easy of recognition.

Magnetic disturbance.—A magnetic disturbance of the compass has been reported at about 10 miles north-eastward of Ujong Perlak, in lat. $5^{\circ} 1' N.$, long. $98^{\circ} 5' E.$

Perlak (Peureula) bank, with depths under 3 fathoms,
35 extends 2 miles eastward and 4 miles northward of the point; spots on it are dry, and others nearly so, at low water, and the sea nearly always breaks over it. The bank may be approached by the lead.

Buoys.—The north-eastern edge of the bank is marked by a buoy painted black and white in vertical stripes, surmounted by a staff and
40 ball, in about 4 fathoms.

A buoy, painted black and white in horizontal stripes and surmounted by a staff and ball, marks the east edge of the bank in about 5 fathoms, northward of a $3\frac{3}{4}$ fathoms spit.

General chart 1355.

Sumatra, North-east coast.



Mouth of
Arakun Dur.

Tanjong Steile.

Steile point to Glumpang. Tanjong Steile bearing 284° true, distant $4\frac{1}{2}$ miles.

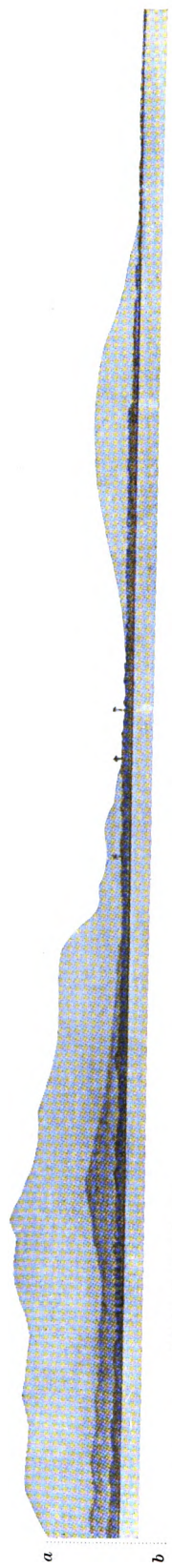


Sungi Lenggo Rajeu.

Boga creek.

*Ujong
Perlak.*

*Mouth of
Sungi Perlak.*



Pedona Besar entrance.

Trees. Edi (Idi).

North high trees.

Edi (Idi) to Sungi Lagot Raja (Leugo Rajeu). Ujong Perlak (Peureula) bearing 233° true, distant $3\frac{1}{2}$ miles.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

Sungi Perlak (Peureula) (Lat. $4^{\circ} 54'$ N., Long. $97^{\circ} 52'$ E.) is approached over Perlak bank, and has a shallow entrance, but inside it is about 50 yards in breadth with a depth of 2 fathoms. The somewhat large village of Perlak (Peureula) is situated about 10 miles up stream. The river banks in its lower portion are marshy, and the first fishing village is about 2 miles up. Above Perlak the ground is higher, and there are pepper gardens and other plantations. 5

Anchorage.—Owing to Perlak bank, vessels must necessarily anchor at some distance from the river, the nearest spot being abreast Ujong Perlak. 10

COAST.—Aspect.—The coast between Ujong Perlak and Ujong Tamiang, a distance of 37 miles, is uniformly low, covered with tolerably high trees and intersected by many unimportant creeks; about midway is Langsar bay. A strip of sand fronts it for the whole distance, with mangroves growing in the morass behind it, and here and there are shallow lagoons between the morass and the sand; beyond a few fishing stations the coast is almost uninhabited. 15

The sandy shore is conspicuous from the offing in places, namely, at Perlak, the mouth of Sungi Jingki, Tanjong Langsar, and between the Telega Muku and Iju (Yu) creeks; between the last mentioned creeks there is a long row of casuarina trees, and also fronting the lagoon southward of the mouth of Jingki creek. 20

The coast is fronted by a mudbank, with less than 3 fathoms water over it, at distances of from one to 2 miles off-shore, and abreast Pulo Perolin to nearly 4 miles off; it may be approached by the lead in most places, but off Pulo Perolin, in Langsar bay, and between Pantei Kerma creek and Tamiang, it is steep-to, dropping quickly to 10 fathoms. 25

Landmarks.—The principal landmark in clear weather off this coast is the waterfall referred to on page 77 (view *b* on page 83). It is about 25 miles within Langsar bay, and 2,887 feet high. Flat hill, 509 feet high, 12 miles south-west of Ujong Tamiang, is also a useful mark. Gunong Langsar, 4,823 feet high, 35 miles within Langsar bay, is a good mark in clear weather, as well as the higher mountain tops charted southward of it. See views on page 83. 30 35

Boga creek, about $2\frac{1}{2}$ miles southward of Ujong Perlak, was formerly of importance as being a short route to Perlak settlement, but it has so silted up as to be only available for canoes.

Sungi Lagot or Leugo Rajeu, 8 miles southward of Ujong Perlak, has a depth of 6 feet at its entrance at low water, and is a good boat passage to Perlak settlement. 40

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

Sungi Jingki (Jeungki) is only available for boats; its banks are marshy and intersected by smaller creeks; about 6 miles up is the village of Krut Renchong at the fork of two streams, above which the land is less swampy, and cultivated. There is a fishing village at the mouth of Sungi Jingki.

Plan of Raja river on 219.

Sungi Raja (Lat. $4^{\circ} 44'$ N., Long. $97^{\circ} 57'$ E.), the mouth of which is marked by a cluster of trees with red foliage, is available for boats; there is a fishing village on the coast, and 5 miles up is the village of Baru; Raja village, through which the coast tramway passes, is about 8 miles from the entrance.

Plan of Langsar bay and river entrance, 3574.

Sungi Bajan or Bajuen, approached from the northward between Pulo Perolin and the main island, is navigable by its northern entrance for vessels of 7 feet draught, and depths of from 3 to 6 fathoms are found within the bar for some distance; its banks are swampy and intersected by numerous creeks. At Randau Panjang village, about 10 miles from the entrance, the river divides; the northern branch leading to Simpang Anas, and the western to Bajan, the residence of the Controller. The entrance south of Perolin is very shallow.

Buoys.—A black conical buoy, surmounted by a staff and ball, is moored off the northern entrance to the river, in about 5 fathoms, as charted.

Two white conical buoys, and a black can buoy, mark the channel into the river; not to be depended on.

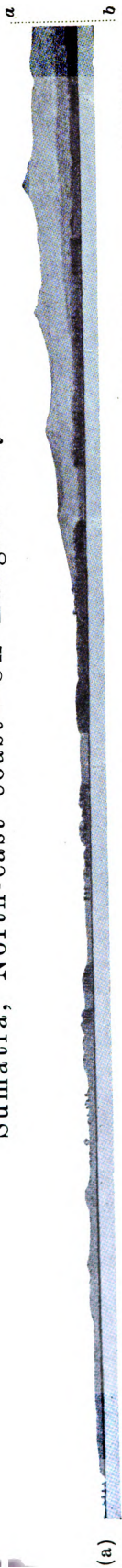
Pulo Perolin, about $2\frac{1}{2}$ miles in length by one mile in width, is low, sandy, covered with casuarina trees, and easily recognised. Mudflats extend $3\frac{1}{2}$ miles eastward of it, with a one-fathom patch at the north-east extreme, at the edge of the 3-fathoms contour. (Chart 1353.)

Ujong Langsar, abreast Perolin, on the opposite side of Langsar bay, is rendered conspicuous by its sandy beach and cluster of casuarina trees; there is also a forked tree higher than the rest over the point. There is good landing in front of the village; mudflats extend eastward of it, as charted. See views on page 83.

LANGSAR BAY (Lat. $4^{\circ} 36'$ N., Long. $98^{\circ} 3'$ E.), between Pulo Perolin and Ujong Langsar, is $4\frac{1}{2}$ miles wide, and contains numerous shoals, between which there are narrow boat channels leading to the various streams that discharge into it. The bay is easily identified by the rising ground behind, against which Pulo Telaga Tuju stands out sharply.

General charts 1353, 1355, 70.

Sumatra, North-east coast—Off Langsar Bay.



(a)

Pulo Rucan.

Pulo Telaga Tuju.

Ujong Langsar.

Sungi Majapahit.

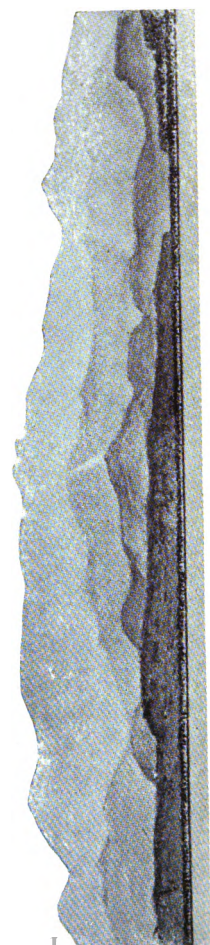


a

b

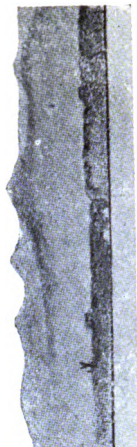
Ujong Perolin.

Northward of Sungi Langsar. Tanjong Perolin bearing 233° true, distant 4 miles.



(b)

Peak in line with Waterfall, bearing 233° true.
Langsar bay.



(c)

Langsar.
Trees.
East Telaga
point. Tuju.

Off the mouth of Sungi Langsar.
Langsar trees bearing 190° true.

Plan of Langsar bay and river entrance, 3574. Var. $0\frac{1}{4}^{\circ}$ E.

Near Ujong Langsar, which is sandy, with a casuarina wood on it, and a few native houses, lies Pulo Telaga Tuju, the outer island, with a buoyed channel to the river on either side of it. Pulo Telaga Tuju is about a mile in extent, covered with trees, and can be distinguished from the main island when coming from the south-eastward; mud-flats, with depths under 3 fathoms, extend 2 miles seaward of it. 5

Tides.—It is high water, full and change, in Langsar bay, at Xih. 30m.; springs rise from 6 to 7 feet.

Tidal streams.—The tidal streams run with considerable strength in the mouths of the rivers. 10

Langsar river and town.—The entrances to Sungai Langsar lie on either side of Pulo Telaga Tuju, connecting at its south end, thence passing southward of Pulo Rawan; both are covered with tall mangroves, and are uninhabited. See views, abreast. 15

The banks are low and marshy for 14 miles, as far as at Kwala Langsar. Above this the land is higher with many plantations. Small craft going up have to be careful of snags, and the strength of the stream is considerable.

The principal products are tobacco, rice, pepper, and rattans. 20

Langsar channel, or Telok Dalam, the northern entrance, has a depth of 14 feet on the outer bar and 12 feet on the inner bar, at low water, spring tides, but it is tortuous.

The eastern channel, Kwala Langsar, southward of Pulo Telaga Tuju, has a fairway depth of 3 feet at low water, spring tides, but is easier navigated. 25

Light-buoys.—A red and black horizontally striped fairway light-buoy, exhibiting an *occulting white* light is moored at $4\frac{1}{4}$ miles eastward of Pulo Perolin in about 6 fathoms, and marks the approach to Langsar channel and river. 30

A white light-buoy, marked No. 2, exhibiting a *white fixed* light is moored on the western side of Langsar channel.

A white light-buoy, marked No. 3, exhibiting a *white occulting* light is moored on the western side of the channel, nearly abreast the north extreme of Pulo Telaga Tuju. 35

A black, light-buoy exhibiting a *white occulting* light is moored at one cable south-west of the south extreme of Pulo Telaga Tuju.

Buoys and beacons.—In addition to the light-buoys, Langsar channel is marked by white conical buoys and white beacons with round topmarks on the starboard side on entering, and by black can buoys and black beacons with square topmarks on the port side, each side numbered from seaward. 40

General charts 1353, 1355, 70.

Plan of Langsar bay and river entrance, 3574. Var. $0\frac{1}{4}^{\circ}$ E.

Eastern entrance.—Buoys.—The eastern entrance is marked by a black can buoy, placed off the end of the spit which extends $1\frac{4}{10}$ miles north-eastward of Ujong Langsar, east side of the entrance, and by a similar buoy off this point; the western side is marked by one white conical buoy, as charted.

Within the junction of the two channels, the buoyage is of the same character.

Anchorage.—There is good anchorage in the approach, for small craft, in about 5 fathoms water, near the outer light-buoy, also eastward of Ujong Langsar flats.

See Inset plan of Birim river on 3574.

Sungi Birim is situated westward of Sungi Langsar; the approach, known as Birim channel, has a general depth of from 19 to 21 feet, and over the bar there is a passage with about 14 feet at low water springs. Within the river and abreast point A, the eastern point of the entrance, there is a depth of 11 fathoms.

It is proposed to erect a wharf, with tramway communication, on the southern side of the river, about half a mile south-eastward of point A.

Buoy.—A black can buoy lies within the bar, on south side of the channel, at about $3\frac{1}{4}$ miles north-eastward of point A.

Sungi Majapahit, or Raja Tua, eastward of Sungi Langsar, has a least depth of 6 feet, is 450 yards wide in the entrance, and deep within, but the mudflat extending from Ujong Langsar fronts it to the distance of 2 miles. The village of same name is 11 miles up. There is a fishing village on the eastern point of the entrance near some casuarina trees.

Chart 1353, Diamond point to Pulo Berhala.

COAST.—Pulo Rukui (Lat. $4^{\circ} 31' N.$, Long. $98^{\circ} 8' E.$), about 4 miles eastward of Ujong Langsar is only an island at near high water, at which time there is a passage within it for canoes only. The tall casuarina trees on the east side of Rukui stream are conspicuous; the mouth of the stream dries at low water. The Raja Muda, between Rukui and the Majapahit, north-west of it, has a least depth of 3 feet.

Sungi Telega Muku, about 11 miles south-eastward of Ujong Langsar, is about a mile wide in its entrance; its channel is dry in places at low water. A large casuarina tree stands on the eastern side of the mouth.

Sungi Yu lies between Sungi Telega Muku and Ujong Tamiang, and on the coast between there is a sandy beach with a long row of casuarina trees. The estuary of this river is about $1\frac{1}{2}$ miles

General charts 1353, 1355, 70.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

broad, but nearly blocked by flats dry at low water; the channel is on the western side and has a depth of $3\frac{1}{2}$ feet at low water spring tides. Vessels of 6 feet draught can ascend nearly to Yu village. Near its mouth is a passage to the Sungai Tamiang, with a least depth of 10 feet and a least breadth of 20 yards. 5

This part of the coast should not be approached to a less depth than 11 fathoms.

Tides.—Springs rise about 7 feet.

UJONG TAMIANG (*Lat. $4^{\circ} 25' N.$, Long. $98^{\circ} 16' E.$*).— 10

This projecting point may be readily identified from all directions by the groups of casuarina trees situated on either side of the mouth of the Sungai Tamiang, and which are visible from a considerable distance. A flat fronts the point to the distance of about one mile, in places not covered at high water; it is steep-to, with a depth of 20 fathoms within a short distance. 15

A bank of small extent, on which the least water found was 13 fathoms, lies 65° true, distant $4\frac{3}{4}$ miles from Ujong Tamiang; there are depths of 20 fathoms around.

Anchorage may be obtained to the eastward of Ujong Tamiang in from 10 to 12 fathoms water. 20

Plan of Tamiang river on 219.

Sungi Tamiang (*Lat. $4^{\circ} 25' N.$, Long. $98^{\circ} 17' E.$*).—Sungi Tamiang, formed by the junction of the two streams Simpang Kanan and Simpang Kiri, is sinuous. Its breadth varies from about 120 yards at its mouth to 70 yards at the first village. Considerable depths are found in the river, which is navigable, although difficult, for vessels of 6 feet draught, as far as Tanjong Semantoh, above Seruwai, which is 10 miles from its mouth, and even higher up. 25

Kwala Besar, the main outlet of this river, lies close westward of Ujong Tamiang, and is about 120 yards broad. Its channel to the sea is close round the point, and between it and the mangrove-covered sandbank westward of it, which portion of the channel is sometimes dry at low water. North-east of the mouth is a sand-cay covered with mangroves, steep-to on its north-east and eastern sides. 30 35

Westward of the Kwala Besar is a delta branch of the Tamiang known as the Kwala Penaga, with a depth of one foot at low water, and unofficially beacons; it discharges into the eastern portion of the Sungai Yu, before mentioned.

The passage from the Sungai Yu and its connection with the Sungai Tamiang affords deeper water (10 feet), as mentioned above. 40

Light-buoy.—A black, light-buoy, exhibiting a *white occulting light every twenty seconds* (light, *ten seconds*; eclipse, *ten seconds*), is moored in 10 fathoms off the mouth of Sungai Tamiang.

General chart 1355.

Plan of Tamiang river on 219. Var. $0\frac{1}{4}^{\circ}$ E.

Buoys.—Within the light-buoy the entrance used is marked by white buoys on the starboard hand and black buoys on the port hand, useful to those acquainted with its navigation.

5 **Seruwai**, the chief town of the district of Tamiang, and a military post, is situated about 10 miles up the river. **Kampong Simpang** lies at the confluence of the **Simpang Kanan** and **Simpang Kalui Kiri**, and can be reached by small steam craft on an ordinary river level. There is a good road to **Aru bay**.

10 **Communication.**—A small steamer maintains fortnightly communications with **Deli river**, &c.

Tides.—It is high water, full and change, off **Ujong Tamiang** at **XIIh. 30m.**; springs rise about 7 feet; the tide rises 2 feet only at the town. The flood stream is scarcely noticeable at times in the
15 river.

Chart 1353, Diamond point to Pulo Besar.

COAST.—General remarks.—The portion of the coast of Sumatra between **Ujong Tamiang** and **Tanjong Tanjung** or **Mati** point, about 97 miles to the south-eastward, is low, thickly covered
20 with vegetation, and consists entirely of an alluvial formation intersected by numerous small rivers, few of which are navigable even for small craft.

The shore is composed of mud overgrown with mangrove trees, here and there intercepted by strips of sandy beach, on which **casuarina**
25 trees are almost always to be found; these are markedly distinguishable from the mangrove owing to their darker colour, greater height, and their fine needle-like foliage; many of them may be seen from a distance of 20 miles in clear weather.

Where the mangrove grows, the ground is inundated, and the man-
30 groves extend back many hundreds of yards; within them the ground is marshy in places, but mostly the land is firm with tall trees; these are rapidly disappearing owing to the increased tobacco cultivation on it.

Landing on the coast, other than by making use of the river
35 channels, is in no case advisable, and is impracticable in the event of any sea or swell, which occurs particularly during the north-east monsoon. At high water, during calms, landing may be effected on the sandy beaches, but not where mangroves exist, as there the ground, if any, is all soft mud. In clear weather some low hills and the moun-
40 tains inland referred to below, will be sighted from the offing above the trees on the coast.

In most places the shore may be approached by the lead.

General chart 1355.

Sumatra, North-east coast.—Off Ujong Tamiang.

(a)

Pulo Kumpei.

Ujong Tamiang.

Sungi Tamiang.

a

b

Iju.

Telaka Muku to Pulo Kumpei. Ujong Tamiang bearing 233° true, distant one mile.

Telaga Muku.

Sumatra, North-east coast.—Mountain Peaks from about 32 miles off the coast.

Gulu.

Jarang. Alas. Bidul.

Pongoesong.

Bandahara.

(b)

Sangkapan.

Gapu.

Badak.

Segama.

Langsar.

10,202 ft.

View of the Mountain peaks of Sumatra from Malacca strait about 40 miles off Aru bay (Lat. 4° 22' N., Long. 98° 54' E.).

Dolak.

Baroa.

Schajak.

Semati. Jindabung.

Simetir.

(c)

View of Mountains southward of the above, from same position.

Chart 1353, Diamond point to Pulo Besar. Var. $0\frac{1}{4}^{\circ}$ E.

Inhabitants.—Malays occupy most of the district from the coast to the foot of the mountains, but the mountains themselves are inhabited by Bataks. The Malays are mostly traders and fishermen; they sometimes own the pepper plantations further inland, but these latter are usually worked by the Bataks. The Chinese are responsible for the latest attempts at land cultivation. There has in later years been a great industrial development in this district, and the previous poverty-stricken districts of Serdang, Deli, and Langkat have greatly benefited. The cultivation of pepper, tobacco, coffee, and the development of the petroleum industry, the wide roads, steam tramways, and railways that have been built, all add to their prosperity. In consequence of the unfitness for habitation of a great portion of the coast, there are but few settlements of any importance in the immediate vicinity of it. Many of the rivers and streams have, however, at their mouths, a fishing settlement or *bagan*, as it is termed, consisting of a collection of miserable huts. The appearance of the coast is, therefore, very monotonous, and it is not always easy to identify the locality in which a vessel may be without some local knowledge of the points and various remarkable groups of trees.

Aspect (*continued from page 81. See views, abreast*).—About 53 miles westward of Ujong Tamiang, in Gajuland (*Lat. $4^{\circ} 16' N.$, Long. $97^{\circ} 25' E.$*), is the eastern end of the Acheh or Atjeh range of mountains with a noticeable peak, 10,202 feet high, the highest point of a broad mountain ridge. The waterfall, 2,887 feet in height, about 23 miles from the coast, and north-eastward of the mountain is a conspicuous object in clear weather to vessels northward of Ujong Tamiang. Gunong Pongongesong, a broad top with three peaks, 8 miles southward of it, is 9,416 feet high, and there are others farther southward, of nearly the same height.

About 16 miles southward of the waterfall is the northern end of the Alas range of mountains in Alas land; this range extends about 50 miles in a north and south direction. Gunong Bandahara, one of the highest peaks, is 9,912 feet high. Gunong Sangkapan, two rounded cone-shaped hills, 6,201 feet high, lies north-east of Bandahara, and Segoma, 6,611 feet, and Gunong Langsar, 4,823 feet, farther north-westward. Segoma has two peaks half a mile apart, and are in line on a south-west bearing.

Southward of the sources of Deli river, in Batakland, is the Batak range, extending nearly parallel to the coast for about 36 miles; Jinabung (*Lat. $3^{\circ} 10' N.$, Long. $98^{\circ} 24' E.$*), 8,137 feet high, is a volcano, of a regular conical form at the back of the range, and, being the highest, is usually to be seen over it; fumes are at times seen rising from its crater.

General chart 1353, 1355.

Chart 1353, Diamond point to Pulo Besar. Var. $0\frac{1}{4}^{\circ}$ E.

There are other mountains of about 6,000 to 7,000 feet high in the neighbourhood.

- 5 From June to February the summits of these ranges are frequently visible from Malacca strait, especially in the morning, but from February to June they are only seen occasionally.

Between Langsar and Aru bays, at about 6 miles back, ranges of hills attain a height of 300 to 600 feet; but eastward of Aru bay the rise is much more gradual. The coast between Langsar bay and Ujong
10 Tamiang is intersected by a number of small streams, with sandy spots in places and clumps of casuarina trees fronting the regular growth of trees. A few fishing huts are generally found in the mouths of the streams.

Plan of Aru bay, 3586.

- 15 **Coast.**—The coast between Ujong Tamiang and the mouth of Langkat river forms a bay about 25 miles wide, and extending about 9 miles back from between these points, with two large islands at its head; the northern one is Pulo Kumpei, and the southern, Pulo Sembilang; at its head is Aru bay. This bay is fronted by mudflats
20 with depths of less than one fathom, varying in distance from $1\frac{1}{2}$ to 5 miles off-shore, the 3-fathoms contour line being about 6 miles distant from the centre of the bay, from which the depths decrease gradually except off the extreme points; the bottom consists of mud, sand, shells, and clay.

- 25 Fishing stakes exist on some of the banks, and are sometimes placed as far off as to be in a depth of 7 fathoms.

Between Ujong Tamiang and Sungai Raja Ulak, 4 miles south-east of it, there are several streams of little use and sandy beaches, upon which, near Pulo Krung Beka, there is a village of Chinese fishermen
30 and traders. Raja Ulak may be distinguished from a considerable distance by its row of dead trees, and its sandy beach, which is visible towards low water. Southward of the latter, as far as Pulo Kumpei, the coast consists entirely of mud covered with mangrove trees.

- 35 There are several unimportant streams between Ujong Tamiang and Pulo Kumpei, mostly dry in some portions of their channels at low water. The Raja Ulak, which has a broad mouth, has a dry sandbank across it at low water. Sungai Ayer Masin and the Seranjaya both enter the sea northward of Pulo Kumpei, and barred by the same flats which extend about $2\frac{1}{2}$ miles off-shore. The high water depths
40 over it to the Ayer Masin is about 8 feet, and to the Seranjaya about 10 feet. Both are deeper within, the latter deepening to 6 and 7 fathoms in places, with a branch from it leading westward of Pulo Kumpei into Aru bay.

General charts 1353, 1355.

Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

There are some fair-sized villages 4 miles up the Ayer Masin, with which a fair amount of traffic is done by local small craft; its entrance is difficult to distinguish.

Pulo Kumpei and Pulo Sembilang, fronting Aru bay, having tall trees growing on them, are visible from a distance of about 16 miles. Thence eastward to Sungai Gebong, about 12 miles south-eastward, the coast is all mud and mangroves, but beyond there are sandy spots in places with casuarina trees. 5

Flat hill (*Lat. $4^{\circ} 16'$ N., Long. $98^{\circ} 8'$ E.*), 509 feet high, 6 miles within Pulo Kumpei, is a useful mark. 10

General directions for navigating the Salahaji and Babalan in Aru bay, also the Langkat, Asahan, and Siak rivers and other navigable streams.

In the bends of the rivers steam vessels must proceed at a speed not exceeding 6 knots; when approaching the bends they must make short quick blasts on the whistle, sound the ship's bell, or a gong. All vessels going up stream, on hearing the signal in the vicinity of a point, must keep close to that point, and if necessary slacken speed or stop, in order to leave the bend clear for vessels descending the river, such vessels to make no more speed than necessary for steerage way. Vessels going in the same direction must only pass one another in a suitable place in the river. 15 20

A sailing vessel at or near a sharp bend must keep close to the shore when a steam vessel is approaching, and must keep on the opposite side of the turn to that chosen by the steam vessel. In the straight reaches of the river, all vessels must keep to the starboard side as much as is possible. Anchoring in bends or in narrow places is prohibited; vessels compelled to stop in such places must run aground. 25

ARU BAY, within Pulo Kumpei and Pulo Sembilang, is 6 miles in length and 3 miles in breadth, but a large portion of it is dry at low water, with numerous shallow passages leading to the several streams discharging into the bay; these unite in two channels, which may be considered as the continuation of the largest of these streams, and principally of the Besitan and Salahaji. 30 35

Towards the head of the bay are a number of mud islets overgrown with mangrove trees, and the shores of the bay are mostly of the same formation, so that, with the exception of the settlements on Pulo Kumpei and Sembilang there are no others of any importance until some distance up the rivers. See views *b* and *c* on page 87. 40

Pulo Kumpei consists principally of firm and comparatively high ground, low at the shores, which are for the most part overgrown with mangroves. The mudflat dries $1\frac{1}{2}$ miles off its northern end, and the depth is under 6 feet for a mile beyond it.

General charts 1353, 1355.

Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

The settlement is at the south point, and on the south-east side are sandy beaches and a grove of casuarina trees.

- 5 The island is covered with tall trees, the tops of which are visible from a considerable distance; the highest is about half a mile from its south end, has a round top, and is easily identified. In the middle of the island there are pepper gardens and other plantations.

- Pulo Sembilang (Sembilan)**, also covered with tall trees, has mangrove shores, except at the north-west and south extremes, 10 which consist of sand. Mudflats dry out as charted for a distance of 3 miles or more, forming the north side of Sembilang channel. On the north-west extreme of the island there are a few fishermen's huts, and upon the south point there are the buildings of the Royal Netherlands Company, for the exploitation of petroleum springs, and the 15 Langkat Company, for bush and land cultivation. Light, *see* page 92.

Pier.—A pier about 280 feet long, with a low water depth of 16 feet, has been erected by the Land company. It is better to wait for flood tide to go alongside. The old wharves are no longer used.

- Telok Tabuham.**—Abreast the pier just mentioned is the 20 Sungai Siur; eastward of it is a slight widening of the Sembilang channel, where there is anchorage in about 20 feet at one cable off-shore. The sea does not usually reach in so far, but an ebb stream of 2 knots must be reckoned on.

- A pier** about 100 feet long has been built (1914) near the entrance 25 to Sungai Siur, with a depth of 14 feet at low water alongside.

There is a framework look-out, about 100 feet in height, situated westward of the light-structure.

- Entrances.**—Kumpei channel, the northern entrance to Aru bay, is between Pulo Kumpei and Pulo Sembilang; the southern, or 30 Sembilang, channel, lies between Pulo Sembilang and the main island, and is the deeper of the two; between these channels are a number of ridges which dry in places at low water.

- Fishing stakes** and enclosures exist on these banks, and one is 35 charted just within the edge of the 5-fathoms contour northward of the light and pilot vessel.

- KUMPEI CHANNEL.** — The bar of the Kumpei, $2\frac{1}{2}$ miles across, with depths under 3 fathoms, has a depth of 10 feet at low water, spring tides, over sand and mud; but the straight channel indicated by the buoys has only a depth of 9 feet. The banks on either 40 side of the fairway are composed of hard sand.

Buoys.—The outer conical buoy, black, and surmounted by a staff and ball, lies in about $4\frac{3}{4}$ fathoms water, on the leading mark.

General charts 1353, 1355.

Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

The channel is marked by white conical buoys on the starboard hand, and black can buoys on the port hand on entering, as charted.

Anchorage.—There is good anchorage about half a mile above Kumpei settlement in a depth of about 5 fathoms; here the fairway is about half a mile wide. The water is much deeper and irregular off the settlement. A patch of 3 fathoms, stony bottom, lies with the south point of Kumpei, bearing 34° true, distant $1\frac{3}{4}$ cables; it is sometimes marked by tide-rips. 5

Directions.—From seaward, by bringing Flat hill (chart 1353) to bear about 270° true, and steering for it, will lead to the outer buoy. The light and pilot vessel (page 92) will probably be seen before the buoy and will be a good guide; thence for a high clump of trees seen between the south end of Pulo Kumpei and the north side of Pulo Sembilang, bearing about 234° true, which leads between the four channel buoys, but vessels should not enter without local knowledge. 10 15

Tides.—It is high water, full and change, at noon; springs rise 8 feet. At Kumpei settlement the tide is half an hour later, with half a foot more rise, and probably more in Aru bay. The highest tides occur nearly 2 days after full and change of the moon. There are two high and two low tides in 24 hours; and from 2 days before to 5 or 6 days after the full and change the rise is nearly as much as at the springs; neaps rise about 3 feet. See also nature of the tides, page 30; tidal signals, see page 93. 20

Tidal streams.—On the bar the flood stream mostly sets south-south-west and the ebb north-east by north at the maximum rate of about 2 knots; but seaward of the outer buoy they set across, the flood setting south-eastward from about 3 hours before to about 3 hours after high water, and the ebb in the opposite direction, both at the rate of about $1\frac{1}{2}$ knots. 25 30

The settlement, on the south point of Pulo Kumpei, has no European inhabitants; a vassal of the Sultan of Langkat and a native overseer are stationed here. The inhabitants are either fishermen or agriculturists, and considerable traffic is carried on by canoes between the settlement and others on the streams in Aru bay. 35

Communication.—There is coasting communication with Deli about once every fortnight.

Supplies.—Poultry, fish, and good water are obtainable.

Sungi Salahaji discharges into the north-west portion of Aru bay, northward of Tanjong Siata, nearly 5 miles within Kumpei village, with a drying bank in its mouth. A narrow channel southward of the bank has a depth of 9 feet least water, but it is not easily navigated. 40

General charts 1353, 1355.

- . *Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.*

Westward of Tanjong Siata the ground is firm, rising behind, and here is the abandoned settlement of Pangkalan Tanjong Batu.

See General directions on page 89.

- 5 **SEMBILANG (Sembilan) CHANNEL** is the deeper into Aru bay; its entrance, which lies about 4 miles south-eastward of that of the Kumpei channel, has a least depth of 16 feet in the dredged channel over the bar, the sides of the channel being steep, and in some places dry at low water. From the south-west point of Pulo Sembilang
10 to Pangkalan Susu, 2 miles above, the sides are also steep, but there is a bar with 13 feet least water between; near Pangkalan Susu the banks are firm, without mangroves.

- LIGHTS.—Pilot vessel.**—A pilot vessel, painted black, with two masts and “Aroe Baai” lettered on the sides, is moored in
15 16 fathoms water at the entrance to the channel, and from it is exhibited a light, for which *see* Light list.

- Vessels requiring a pilot should hoist the usual signal in good time. Vessels of war are first attended to. Vessels arriving together will be given preference according to tonnage. Pilotage begins at the light-
20 vessel, and is compulsory for other than war-vessels. Vessels leaving should give notice for a pilot 24 hours beforehand.

- Masters of vessels arriving are required to give the pilot the following information: (1) Name of vessel and captain; (2) nationality; (3) place from and where bound; (4) whether she has combustible or
25 inflammable materials on board. If from a port where there was infectious disease, or has a case on board, the quarantine regulations must be obeyed.

The pilots are under the direction of the Harbour master at Pangkalan Berandan (page 94).

- 30 Tidal signals, *see* page 93.

LIGHT.—Sembilang (Sembilan) (*Lat. $4^{\circ}8'N.$, Long. $98^{\circ}15'E.$*).—A light is exhibited on the east extreme of the south point of Pulo Sembilang, from a white iron framework, 38 feet in height. *See* Light list.

- 35 **Light-buoys.—Buoys.**—On the starboard side of the channel there are several white conical buoys, numbered from seaward; No. 2 shows a *white fixed* light, and Nos. 7 and 8 *green lantern* lights when required.

- 40 The channel is buoyed on the Netherlands uniform system—white to starboard, black to port, on entering.

The port side of the channel is marked by several black can buoys, numbered from seaward; of these Nos. 3 and 5a each exhibit a *white occulting* light with a period of *twenty seconds*, showing light for *ten seconds*, followed by an eclipse of *ten seconds* duration. No. 5 buoy

General chart 1355.









Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

shows a *white fixed* light, and Nos. 6 and 9 *red* lantern lights, when required.

A beacon, 98 feet high, is situated on the edge of the shallow bank, at about 2 cables westward of No. 2, the outer white light- 5
buoy.

The buoys should not be depended on.

Tidal signals.—The following tidal signals are made from the pilot vessel, the flags used by day consisting of a blue triangular, and a white flag with a black cross; *white* lights are shown at night:— 10

DAY SIGNALS.			
			
NIGHT SIGNALS.			
			
Flood.	High Water.	Low Water.	Ebb.

Directions.—It is not advisable to attempt this channel without local knowledge, or the depth on the bar being accurately known. Vessels entering should enter about three-quarters flood, so as to be able to cross the inner bar with 13 feet least water, below Pangkalan Susu, if bound there. 15

The bottom on the outer bar is fairly hard, and in the channel mud and sand.

The pilot vessel may be made from the south-eastward by approaching Flat hill on the bearing of about 290° true, which leads directly to it, and from the northward by giving Ujong Tamiang a berth of 20
about 5 miles, and from thence steering 150° true, until sighted, and using the lead. From abreast the pilot vessel, steer to pass between the buoys marking the sides of the channel.

The light-structure on Pulo Sembilang in line with No. 2 white light-buoy or well open southward of the beacon near it, bearing 236° 25

General charts 1353, 1355.

Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

true leads from the light-vessel, southward of No. 1 white buoy to the outer pair of buoys.

At night.—Should a vessel be leaving at night, the lantern lights
5 *green and red*, will be shown on the four buoys mentioned. *See* tidal signals.

Pangkalan Susu is the small settlement situated about $3\frac{1}{2}$ miles above that on the south end of Pulo Sembilang. The shipment of petroleum and benzine is now done from here by tank vessels, loaded
10 from lighters.

Besitan river discharges into the southern head of Aru bay, is navigable for vessels of about 7 to 9 feet draught, and may be approached by either the Kumpei or Sembilang channels. The military post of Bukit Kubu is situated on it, at about 12 miles from the
15 village on Pulo Kumpei. *See* General directions on page 89.

SUNGI BABALAN lies about 4 miles south-eastward of Pulo Sembilang, is 3 cables in breadth at its mouth, has a least depth of 3 feet, over hard sand and mud, in its channel, abreast the tide gauge, and is available for small craft with local knowledge. There is a bar
20 with same depth just below Pangkalan-Berandan.

About 4 miles above its mouth, on the southern shore, is the fort of Pangkalan-Berandan of the Royal Company for working petroleum wells in Langkat. Here is a pier with a depth of 11 feet alongside its extreme at low water; the river is about one cable wide abreast
25 it, with a depth of 7 fathoms; in the fairway the river is shallow and depths irregular a short distance above.

LIGHT (*Lat. $4^{\circ} 5' N.$, Long. $98^{\circ} 18' E.$*).—A light is exhibited, on the west bank of the river entrance, from a white framework, 38 feet in height. *See* the Light list.

30 A light is also shown at the junction of Sungai Tanjong Balei and the Babalan.

Light-buoys.—A white buoy, exhibiting a *white fixed* light, marks the starboard side on entering.

A black buoy, exhibiting a *white occulting* light *every thirty*
35 *seconds*, marks the port side, 2 miles within the white buoy.

Buoys.—Two white conical buoys mark the starboard hand within the white light buoy; two black can buoys mark the port hand, when entering; the outer one is seaward of the white light-buoy and the other within that buoy, as charted.

40 **Tide gauge.**—A tide gauge, surmounted by a red ball, is situated within the black light-buoy.

Tides.—It is high water, full and change, in Babalan channel at 0h. 15m.; springs rise 7 feet.

General charts 1353, 1355.

Plan of Aru bay, 3586. Var. $0\frac{1}{4}^{\circ}$ E.

At Pangkalan-Berandan it is high water about one hour later. The streams in the entrance run in the direction of the channel from about half ebb to half flood.

Directions.—*See* General directions, on page 89.

5

Sungi Lepan, eastward of Babalan river, is narrow and tortuous, and has a depth of about one foot in its approach. Far inland are the petroleum springs of the Royal Netherlands Shipping Company.

Chart 1353, Diamond point to Pulo Berhala.

10

COAST.—Gebong and Serapo rivers lie 8 and 9 miles, respectively, eastward of Sungi Babalan; the coast between is composed of mud and mangroves, but on the eastern side of the mouth of both streams is a sandy beach.

Sungi Gebong (Gebang).—**Buoy.**—A conical buoy, chequered black and white, and surmounted by a staff and ball, is moored about $3\frac{3}{4}$ miles northward of the entrance to Gebong river, a little north-eastward of the one-fathom edge of the bank. The depth over the mudflat in the approach to the river is about 11 feet at high water springs.

20

Sungi Serapo.—The entrance to this river is easily recognised by the high trees lining the banks; it should be approached when bearing about 170° true. The bar has a depth of $4\frac{1}{2}$ feet at low water springs.

Light-buoy.—A white light-buoy, exhibiting an *occulting white* light every twenty seconds (light, ten seconds; eclipse, ten seconds), is moored about half a mile off the entrance, as charted. The track from seaward is from the light-buoy moored $2\frac{4}{10}$ miles northward of Ujong Damar, to the above light-buoy, and from thence 184° true into the river; but it can only be used by small craft locally acquainted.

30

A narrow channel, available for small craft, connects Serapo river with Langkat river.

Ujong Damar, the most projecting portion of the coast between Serapo and Langkat river, consists of sandy beaches, overgrown with dark tall trees, which are visible from a considerable distance.

35

SUNGI LANGKAT, about half a mile wide in its entrance, lies between Ujong Damar and Pulo Tapakuda, and is easily identified from seaward by the high trees on the point and the island; those on the latter are casuarina trees. *See* views of coast on pages 80, 83.

The flats, in its approach, which extend about 4 miles off, are very steep-to, and have a low water depth at springs of about 3 feet; the eastern side of these flats should not be approached to less than

40

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

14 fathoms. Within the flats the depths are not less than 2 fathoms at low water, but most of the buoys and lights have been removed. (See directions.) The bottom is composed of tolerably hard sand and mud, and the banks on either side are hard, steep-to, and dry in places at low water, as charted.

About 2 miles above the east point of entrance the river is only about 45 yards wide, leaving barely room for small craft to pass one another.

10 The river rises at the foot of the Bendo Benuwa, north end of Toba lake; it flows through a cleft in the high land, makes a sharp bend by the Jinabung mountains, and forces its way over the mountain side, where it forms a waterfall, said to be from 300 to 900 feet in height. Further on it flows through the great plains to its entrance.

15 **Light-buoy.**—A white light-buoy, exhibiting a *white occulting* light is moored 5° true, distant $2\frac{4}{10}$ miles, from the conspicuous tree on Tanjong Damar, in a depth of about 7 feet, as charted.

It marks the approach both to the Langkat and Serapo rivers.

Buoys.—A black buoy, surmounted by a ball, is charted at a distance of $1\frac{3}{4}$ miles northward of the light-buoy, in about $4\frac{3}{4}$ fathoms. Within these, white buoys mark the starboard hand and black buoys the port hand on entering, but they are not to be depended on.

A wreck is charted (1913) at $1\frac{1}{2}$ miles northward of the black buoy.

Tides.—It is high water, full and change, at 1h.; springs rise 7 feet.

25 **Tidal streams.**—The streams run at the rate of $2\frac{1}{2}$ knots in the river.

Directions.—There are two buoys in the approach, one of which is a light-buoy, previously mentioned.

The former course to the river mouth from these buoys was about 30 166° true, but it cannot be relied on.

The entrance is only available for small local craft acquainted with it. The lights and most of the buoys have been removed. Fishing stakes are placed on the banks on both sides of the channel.

The Langkat may be reached by the Serapo, in which there is more 35 water. The outer light-buoy lies in the approach to both rivers.

See General directions on page 89.

Town (*Lat. $3^{\circ} 55' N.$, Long. $98^{\circ} 25' E.$*).—Tanjong Pura, about 12 miles up the river, is the capital of the province of Langkat, and the seat of government. There is a garrison, a post, and telegraph 40 office.

Some Europeans reside here, and there are numbers of Chinese labourers, in addition to the native population.

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

Binjei, the capital of the sub-district of Upper Langkat, is situated on the Binjei branch.

Communication.—Two steam vessels are in regular communication with Penang; a steamer from Deli calls every fortnight. 5

Trade.—There are petroleum oil springs in the district; and the greater portion of the output of refined oil is sent by steamers to Penang and Singapore.

COAST.—Between Langkat and Deli rivers, in the various river mouths are a number of islets, the most prominent of which is Tapa- 10
kuda, about 2 miles eastward of Sungai Langkat, which is formed of sand, covered with tall casuarina trees; a shallow bank extends about one mile off it. Pula Paho, south-east of it, is of a similar character, composed of mud and mangroves, with a single high tree and a group of others. 15

Sungi Tapakuda (*Lat. $4^{\circ} 0' N.$, Long. $98^{\circ} 32' E.$*), westward of these islands, formerly had a depth of 16 feet in its approach at high water spring tides, in a narrow channel over the bank in which the tidal streams ran with considerable strength; it can only be entered by small craft locally acquainted. The small rivers between it and 20
Deli river are nearly dry at low water, and the coast is fronted in places by a shallow bank extending to the distance of about 2 miles.

Karang Gading is a ridge, with depths of $2\frac{1}{4}$ to 3 fathoms, over hard bottom, extending from Batu Chamal, about 7 miles in a north-west direction parallel to the coast, its northern extreme being on the 25
parallel of the mouth of Sungi Tapakuda; depths of less than 5 fathoms extend 4 miles farther north-westward. It may be approached by the lead, and generally shows discoloured water; there are numerous fishing enclosures on it.

A wreck (1908) is charted south-eastward of Karang Gading, 30
between the 3 and 5-fathoms contour lines.

Ujong Batu Chamal, or Beting Chamar, is a rounded point situated about 10 miles south-eastward of Sungi Tapakuda; both it and Ujong Ahu, 3 miles north-westward of it, have sandy beaches, with a few casuarina trees, but these points are not easily identified. 35

COAST. — General remarks. — Aspect. — From Batu Chamal past Sungi Deli to Sungi Serdang, a distance of 15 miles south-eastward, the coast consists almost entirely of mud and mangroves, but beyond Serdang river, and past Ujong Sibunja Bunja, there is a considerable amount of sandy beach, with casuarina and other tall 40
trees for 18 miles, as far eastward as the remarkable tree of Meng-

General chart 1855.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

kudu (Lat. $3^{\circ} 34' N.$, Long. $99^{\circ} 10' E.$). From Mengkudu beyond Telok Baharu there is again mud and mangroves, succeeded by sandy shores with a luxuriant growth of casuarinas, up to Tanjong Tanjung or
5 Mati, a further distance of about 20 miles. The whole is fronted by a shallow bank, varying from half a mile to 3 miles off-shore, with Deli bank and the Bunja shoals in the offing. See views, abreast.

As most of the plantations owned by Europeans lie near the coast, there is local traffic for small steamers, for which the mouths of the
10 important streams are beacons and lighted by small lights, of no use to passing vessels.

There are also, at several places along the coast, fishing stations of some size, of which, however, but little can be seen from the offing. There are also numerous fishing stakes on the banks fronting the
15 shore, mostly within the 3-fathoms limit, but in places they extend out to the depth of 5 fathoms.

Most of the banks can be approached by the lead, but the bank on the east side of the approach to Deli river is steep-to, as is also that eastward of Telok Mengkudu. The depths also are somewhat irregular
20 off this coast, and the bottom contains more stones than that farther westward.

Anchorage.—There is good anchorage in most places along this portion of the coast.

Plan of Deli river on chart 1353.

25 **SUNGI DELI. — Belawan mouth** (Lat. $3^{\circ} 48' N.$, Long. $98^{\circ} 42' E.$).—Deli river has two entrances, with Pulo Belawan lying between them. Belawan, the northern mouth, had a depth of $14\frac{1}{2}$ feet (at high water, spring tides), apparently, in June, 1914, on the line of the leading-lights, with a breadth of about 44 yards, over
30 a soft muddy bottom. The channel is marked by light-beacons. Within the flat the water deepens, there being from 5 to 7 fathoms abreast the town of Belawan. Vessels of 12 feet draught should, therefore, be able to enter the river at high water, in charge of a pilot; combined with the railway to the interior, it makes this the principal
35 harbour of the Deli district.

A powerful dredger has been ordered, with the object of increasing the depth on the bar to 21 feet, and, if successfully accomplished, later to 25 feet.

Within a mile of Ujong Belawan and up river the sides of the
40 channel are steep-to, the east side being composed of hard sand, whilst to the westward is the extensive mudbank which fronts the shore; the bottom in the fairway is mud.

The southern mouth is shallow and barred by the railway bridge which crosses it to Pulo Belawan. Only very small craft can go up
45 to Labuan Deli.

General chart 1355.

Sumatra, North-east coast.

212° true.

246° true.



230° true.

Deli road.

Sungi Deli entrance bearing 246° true, distant 19 miles.

Malacca Strait. South side of the Fairway.



Berhala.

Pulo Berhala (Varela) bearing 186° true, distant 1½ miles.

Plan of Deli river on chart 1353. Var. $0\frac{1}{4}^{\circ}$ E.

LIGHT-VESSEL (Lat. $3^{\circ} 54'$ N., Long. $98^{\circ} 43'$ E.).—A light is exhibited from a light-vessel moored in about 4 fathoms, distant $2\frac{1}{2}$ miles off the western shore and about $5\frac{3}{4}$ miles, 347° true, from Ujong Belawan. The vessel, painted red, and with "Deli" in white letters on the sides, has an iron tower supported on four legs, from which the light is shown. *See the Light list.* 5

Should the illuminating apparatus be under repairs a bell will be sounded.

LIGHT.—A light is exhibited from a white iron framework, 42 feet in height, situated at Pulo Nunang, near the Research office on the north side of the river, about one mile within Ujong Belawan, for which *see the Light list.* 10

Light-beacons.—Within the light-vessel are five beacons carrying lights, at a height of about 25 feet above high water, the beacons being of the same colour as the light; these afford leading lines for the several reaches of the channel. For details *see the Light list.* 15

- (a) The outer beacon lies 24° true, distant about 4 miles from the Look-out beacon, east of Bagan village.
- (b) Beacon lies 29° true, distant about $3\frac{5}{10}$ miles from the Look-out beacon. 20
- (c) Beacon lies 27° true, distant about $2\frac{2}{10}$ miles, from the Look-out beacon.
- (d) Beacon lies 27° true, distant about $1\frac{9}{10}$ miles, from the Look-out beacon. 25
- (e) Beacon lies 30° true, distant about $1\frac{3}{10}$ miles, from the Look-out beacon.

Buoys.—A light-buoy, showing an *occulting white* light, marks the edge of the northern bank at 3 cables southward of Ujong Belawan. Within this buoy the channel is marked by white conical buoys on the starboard hand and black can buoys on the port hand, on entering, as charted. 30

Pilots.—Steam vessels can obtain the services of the Harbour master.

Harbour dues are proposed, commencing at a date not fixed. A harbour board has been formed, and several large warehouses constructed at Belawan. 35

Outer anchorage.—Vessels may anchor near the light-vessel, according to draught, avoiding the wreck (1906) charted eastward of her. 40

Directions.—*See* views on pages 87, 98. Vessels of 12 feet draught can enter at high water and proceed up to Belawan, but it

General chart 1355.

Plan of Deli river on chart 1353. Var. $0\frac{1}{4}^{\circ}$ E.

would be advisable for a stranger to secure the services of someone acquainted with the river on a first visit, and to be certain of the depth on the bar.

- 5 From abreast the light-vessel; the outer red beacon (*a*) and the white one within it (*b*) will be in line bearing 170° true, and should be steered for until the red beacon (*d*) is in line with white beacon (*e*), bearing 198° true, when they should be steered for, until white beacon (*b*) is in line with red beacon (*c*) astern, bearing 39° true, astern.
- 10 From abreast Ujong Belawan, steer to pass a little southward of the white light-buoy and of the white buoy within it, thence between the white and black buoys marking the sides of the channel.

- In entering, course should be altered in good time to bring the vessel on the several lines of the leading beacons at the turning points
- 15 in the channel.

- Tides.**—Both systems of tide are noticeable, but the semi-diurnal character prevails. Springs occur $1\frac{1}{2}$ days after full and new moon, with high water at about IIh. and a rise of 7 feet; neaps occur $1\frac{1}{2}$ days after quadrature, with high water at about VIIIh. and a rise
- 20 of 7 feet. In the second half of March and September springs rise 8 feet and neaps one foot. In the second half of June and December springs rise 6 feet and neaps $2\frac{1}{2}$ feet.

- Single daily high water occurs 1st January at XIIh. p.m.; 1st April, Vh. p.m.; 1st July, XIh. a.m.; 1st October, Vh. a.m. Springs occur
- 25 about 2 days after the moon's greatest declination, with a rise of 2 feet; neaps occur about 2 days after moon's declination is nil, with a rise of $1\frac{1}{2}$ feet.

- In the second half of June and December springs rise 3 feet and neaps 2 feet, and in the second half of March and September one foot
- 30 and half a foot, respectively. The high and low water springs of both systems cannot occur simultaneously. The highest level of water is reached in about the middle of May and November at IIh. p.m. and IIh. a.m., respectively.

- Tidal streams.**—At springs, the flood stream in the river runs
- 35 at the rate of $1\frac{3}{4}$ knots, and the ebb about $2\frac{3}{4}$ knots, turning from one to 2 hours after high and low water, respectively. At the light-vessel the streams run from $1\frac{1}{2}$ to 2 knots, across the entrance, the flood to the south-eastward and the ebb to the north-westward.

- Belawan.**—**Pulo Belawan** (*Lat. $3^{\circ} 47' N.$, Long. $98^{\circ} 42' E.$*)
- 40 is formed chiefly of mud and mangroves in great part flooded at high water; on the west side is the town and harbour of Belawan, and on the east is a fishing village.

Railway.—Belawan is the terminus and transshipping station for the Deli railway; on account of its unhealthiness, most of the Euro-

General chart 1355.

Plan of Deli river on chart 1353. Var. $0\frac{1}{4}^{\circ}$ E.

peans and railway officials reside at Labuan Deli, about $2\frac{1}{2}$ miles above Belawan, or at other places near the railway line, which crosses the channel south of the island by a bridge. There are numerous natives and Chinese at the settlement, numbers of the latter being employed as wood-cutters. The settlement is spreading and developing. 5

The harbour has depths of from 5 to 6 fathoms, but it is somewhat narrow in places, rendering it desirable to moor. There are wharves in front of the town for the use of local steamers, which lie alongside them. Depths of from 5 to 7 fathoms are maintained for some distance above the town; but only steam launches and boats can ascend to Labuan Deli. 10

Wharves.—Vessels plying regularly lie at their respective wharves; others moor at the Government wharf, which is 300 feet long, and has two cranes and a railway from it to the station. The north end of the Holt steamers' wharf shows a light at night. 15

Communication.—There is constant steam communication with Penang and Singapore. Netherlands small mail steamers ply along the east coast of Sumatra. See also page 18. 20

Railway communication with Medan, which is the railway centre, with branches to other parts (*see* page 100); also telephonic communication with Medan, and telegraphic communication with Tapanuli on the west coast. Submarine cables are laid to Penang and Olehléh. See also Chapter I., page 6. 25

Coal and supplies.—There is a Government coal wharf, with a depth of 18 feet off it at low water, above the settlement. Coaling is carried on by baskets, and vessels are only allowed to take a sufficient quantity to enable them to reach the nearest coaling station. Water is laid on to the wharf. 30

There is a small pier with a depth of 6 feet alongside it, and a crane by the company's gas sheds.

Near the railway terminus is an artesian well from which good drinking water is obtainable. Wood for fuel, which is commonly used by the coasting steamers, is obtainable, but for supplies of provisions it is necessary to send up to Labuan Deli or Medan, which places are supplied by steam vessels. 35

Repairs.—Small repairs to hull and machinery can be effected in the workshops at Medan.

Trade.—The chief imports are cotton goods, machinery and implements, haberdashery, matches, tea, beer, condensed milk, &c.; the exports consist of pepper, benzine, petroleum, rattans, rubber, and various products; over 100 motor-cars were imported in 1913, bringing 40

General chart 1355.

Plan of Deli river on chart 1353. Var. $0\frac{1}{4}^{\circ}$ E.

the number to above 500, for use on the estates. The Customs receipts for the year 1913 amounted to £209,764.

Shipping.—In 1913 the number of British steam vessels engaged in the foreign trade of the port was 127, having a total tonnage of 146,845 tons, and of sailing vessels 191, with an aggregate tonnage of 37,442 tons; 567 steam vessels of all nationalities, of the aggregate tonnage of 658,849, entered. Of these, 171 were British, 216 Dutch, and 180 German. See Trade, page 103.

10 *Chart 1353, Diamond point to Pulo Berhala.*

Medan (Lat. $3^{\circ} 36' N.$, Long. $98^{\circ} 40' E.$), the capital of Deli, and about 12 miles from Belawan, is the head-quarters of the Dutch Resident of the east coast of Sumatra, and of the chief of the military government of the district. It is a pleasant little town, laid out in orthodox Dutch fashion, with a grass medan, or plain, in the centre, surrounded by ornamental trees. There are two banks, two hotels, two clubs, post and telegraph offices, a hospital owned by the Deli shipping company, and numerous houses of business; the streets, most of the shops, and large houses are lighted by electricity. It owes its importance, as does also the whole district, to the extensive cultivation of tobacco. The population, in 1911, numbered 26,990, including 1,266 Europeans. The Sultan's palace lies just outside Medan.

Communication.—Railways.—The central railway station is at Medan, from which lines run northward to Belawan; eastward to Serdang and Bobongan (Perbuangan), about 12 and 20 miles, respectively, with an extension from Lubu Pakam to Bangun Purba and another from Bobongan to Tebing Tinggi. Good progress (1913) has been made with the line from Tebing Tinggi to Tanjong Balei in the Asahan district, to the south-eastward, the probable date of completion being 1916. The new line from Tebing Tinggi to Dolok Merawan is expected to be completed in 1916, and the latter place connected with Siantar by the end of that year. There is a short line from Medan southward to Deli Tua, a distance of 6 miles, and westward to Timbang Langkat and Selesseh. Over 260 miles are now in use on the east coast, and about 75 miles under construction.

Telegraphic communication with all lines and telephonic communication between the town and all the different estates.

The roads in Deli are in very fair order, with substantial bridges where necessary. A road from Medan to Belawan is under construction. Tramways run to various places along the coast.

Deli district is made up of three states; Deli is the centre under a sultan; Langkat to the northward under a native chief or Pang-

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

heran; and Serdang to the southward, also under a sultan, the whole being under the Dutch Resident at Medan.

Trade.—Deli, Langkat, and the other tobacco growing districts are celebrated throughout the world for their fine silky tobacco leaf. 5
Tea and pepper are grown, and coffee is being planted in Upper Deli, Upper and Lower Langkat, and other parts. Kerosine oil is exported in some considerable quantity from Langkat. A number of engineering firms here begun business to meet the demand from rubber and other factories. A British engineering company has established itself 10
in Medan, and possesses a fully-equipped repair and workshop near the town.

Shipping.—See Belawan, page 102.

Climate.—The health of the country may be considered good, though unseasonable weather often brings epidemics of fever and beri- 15
beri, especially among newcomers. Isolated cases of cholera occur. The mornings are fresh and cool.

COAST.—Between Sungi Deli and Tanjong Tanjung or Mati, 55 miles south-eastward, there are several small rivers, the entrances to which are passable only by small trading craft at or near high 20
water; the most important have small lights at the entrances.

Ujong Perling (*Lat. $3^{\circ} 47' N.$, Long. $98^{\circ} 44' E.$*), 2 miles south-eastward of the Sungi Deli, is overgrown with mangrove trees, off which a mudbank dries at low water to the distance of $1\frac{1}{2}$ miles. About one mile and 3 miles south-eastward are the mouths of the Sungi Panglima 25
and Sungi Perchut, respectively; both entrances are dry at low water. There is a fishing station at the mouth of the latter, and Perchut village is about 4 miles from the entrance.

Sungi Serdang, about 8 miles south-eastward of Sungi Deli, flows through one of the Deli tobacco growing districts already 30
described, and is about 90 yards wide in its entrance and nearly dry at low water spring tides in its approach; the shore bank on either side dries off about half a mile. Rantau Panjang village is situated at the mouth and higher up there are several villages on both banks.

Westward of the mouth is a strip of sandy beach, and beyond it the 35
Sungi Tuan (Baru). Eastward of the mouth of the Serdang, as far as Sungi Kuru, the shore is sandy, with cocoanut trees at intervals, near which are fishing huts, and $2\frac{1}{2}$ miles eastward of the Kuru is Serdang tree, 197 feet in height, close to the shore, and forming a conspicuous 40
mark.

Communication.—About 6 miles from the entrance to the Sungi Serdang, and not far from the river bank, is Serdang station of the Deli railway.

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

Supplies.—A few supplies are obtainable at Rantau Panjang.

Kuru, Ular, and Denai rivers, from 3 to 5 miles eastward of Sungi Serdang, are all nearly dry at low water; the two latter are about 3 cables apart; the coast eastward of Sungi Kuru is chiefly mud and mangroves. Near Sungi Denai is an extensive grove of trees.

Ujong Sibunja Bunja.—At one mile eastward of Sungi Denai, the mangroves give place to a sandy beach, which continues to Ujong Sebunja Bunja, with casuarina trees in places. Near the point there is a small but dense wood of these trees which serve to distinguish it in the offing. The bank dries off here about $1\frac{1}{2}$ cables only, and there is a depth of 3 fathoms at about three-quarters of a mile off-shore. Patches of 4 fathoms, with deeper water around, lie about 2 miles off.

Sungi Perbaungan, dry at low water in its entrance, which is about 50 yards in breadth, lies close southward of Ujong Sibunja Bunja; between, within the hook of the point, is a shallow and muddy lagoon about one mile in length. There is a fishing station in the cluster of casuarina trees near the western point of entrance, where small local supplies are obtainable.

There are a pier and shed at the west point, where a small light is shown for local craft. The buildings are white, and may be seen at some distance when bearing westward of 224° true.

Communication.—A road leads through tobacco plantations to the Perbuangan station of the Deli railway, distant about $5\frac{1}{2}$ miles in a direct line.

Sungi Sijengi.—From the Sungi Perbuangan, the coast is sandy to Tanjong Sijengi, which point is marked by some casuarina trees; some villages lie within the point, but are not visible from seaward. The shore bank dries off about 3 cables. Sijengi ridge is described on page 108.

Telok Mengkudu (*Lat. $3^{\circ} 36' N.$, Long. $98^{\circ} 6' E.$*).—Between Sungi Sijengi and Mengkudu tree, 8 miles eastward, the coast, fronted by a sandy beach, forms a slight bight, known as Telok Mengkudu, into which discharge the Baharu, Pa Nipa (Nipa) and Mengkudu rivers, all small streams, which dry at low water, and have mud and mangroves at their mouths; there are villages near all these rivers.

The depth in Telok Mengkudu is 3 fathoms at $2\frac{1}{2}$ miles off-shore.

Mengkudu tree, 3 miles south-eastward of the river of that name, is 220 feet in height, and visible in the offing from a distance of about 18 miles; its roots many years ago were being undermined by the sea, and it may possibly be down; within it, however, there are other tall trees, but of less height.

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

Sungi Bedagei (*Lat. $3^{\circ} 31' N.$, Long. $99^{\circ} 14' E.$*), about 5 miles south-eastward of Mengkudu tree, is a third of a cable wide in its entrance, with a depth of one foot at low water, spring tides, over the bank in its approach. The mudbank dries off to the distance of 3 cables. There is a little beach on either side of the mouth of the river, and from the offing a high wood just eastward of the river, and some groups of trees farther eastward, may serve to identify it. 5

Sungi Padang.—From Sungi Bedagei to Sungi Padang, 5 miles south-eastward, the coast is all mud and mangroves. Sungi Padang is 4 cables wide in its estuary, and has a depth of $1\frac{1}{2}$ feet at low water spring tides over the bank in its approach; the eastern point of the river has a small sandy beach, and the channel is half a cable in breadth. 10

LIGHT (*Lat. $3^{\circ} 27' N.$, Long. $99^{\circ} 18' E.$*).—A light is exhibited from a white iron framework, 42 feet high, situated on the southern side of the entrance to Bandar Kalipa. See the Light list. 15

Beacons.—The channel, as far up as the settlement of Bandar Kalipa, is unofficially marked, on the starboard side, by beacons surmounted by balls, and on the port side entering, by beacons surmounted by crosses; the outer beacons are about half a mile north-north-eastward of the mouth. None are charted, and are not to be relied on. 20

Settlement.—The settlement of Bandar Kalipa is situated about half a mile above the entrance, on the western bank. Coasting steamers and other trading craft call here in connection with the tobacco plantations situated farther inland. 25

Fishing stakes.—On the coast bank there are several large fishing enclosures extending into a depth of 5 fathoms.

Tides.—Springs rise about 7 feet. 30

Sungi Paguruwan, $2\frac{1}{2}$ miles south-eastward of the Sungi Padang, with a mangrove coast between, is 5 cables wide in its entrance, which, being open, is easily discerned from the offing, at one mile above the entrance, abreast the settlement on the eastern shore, it is $1\frac{1}{2}$ cables wide. The depth is only $1\frac{1}{2}$ feet at low water springs, in the channel over the bank fronting it. A conspicuous tree, 190 feet high, is charted on the east point of the entrance. 35

LIGHT.—A light is exhibited near the Custom-house at the settlement, on the south side of the entrance, from a white iron framework 42 feet in height. See Light list. 40

Beacons.—The channel is marked by beacons on either side as far as the settlement, the outer one being about half a mile seaward of the mouth. At night, by steering for the light, when bearing

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. $0\frac{1}{4}^{\circ}$ E.

205° true, will lead to the outer beacon, but it is not to be depended on.

Trade.—Small coasting steamers and other trading craft call here in connection with the tobacco plantations situated inland.

Charts 794, 1353.

Sungi Pare Pare (Si Pari Pari), 3 miles south-eastward of the Paguruwan, with a mangrove coast between, is about 5 cables wide in its estuary, which is known as Telok Baharu, and has a least depth of 10 $1\frac{1}{2}$ feet at low water, spring tides, over the bank in its approach; the small settlement named Baharu, with but little trade, is not visible from seaward; there are others farther up stream. The shore mud-bank dries off about 4 cables between the Paguruwan and Telok Baharu, decreasing eastward towards Tanjong Tanjung to one cable, 15 where it is sand.

Beacons.—The west side of the channel is unofficially marked by stake beacons, the outer one being about 3 cables northward of the east point; not to be depended on.

Tanjong Badak Mati.—From about one mile eastward of 20 Telok Baharu, the coast gradually changes from mud and mangroves to a sandy beach, with casuarina trees in places.

Tanjong Badak Mati, 4 miles south-eastward of the Pare Pare, is almost entirely composed of sand, and distinguished by a long row of casuarina trees. The small settlements on this coast are not usually 25 visible from seaward.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

Tanjong Tanjung or Mati point (Lat. $3^{\circ} 21' N.$, Long. $99^{\circ} 29' E.$).—About $3\frac{1}{2}$ miles south-eastward of Badak Mati, is Tanjong Tanjung, a somewhat prominent point, beyond which the 30 coast turns sharply to the southward. The coast between has a sandy beach, and it is less densely covered with vegetation than that farther westward; at about half a mile westward of the point there is a clump of casuarina trees, and the same distance beyond is a clump of coconut trees.

35 **Sungi Tanjung**, entering the sea at Tanjong Tanjung, is about 150 yards broad at its entrance, which has a depth of half a foot at low water, spring tides; westward of the river there are shrubs and low trees, but there is a conspicuous casuarina tree on the beach at half a mile westward of the mouth; half a mile farther westward is a 40 row of coconut trees. The eastern entrance point is thickly wooded with tall trees close down to the beach; at about one mile southward of it the sandy shore again gives place to mangroves. A portion of the coast bank, forming the east side of the channel to the river, covers

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

at high water, spring tides, and off the point the bank dries about 3 cables, and is steep-to beyond. The tidal streams cause a race here.

The channel is unofficially marked by stake beacons.

Settlements.—There is a small settlement, with Customs-house, near the entrance, and several European tobacco plantations at about 4 hours' journey up stream. A small coasting steamer from Asahan river calls here monthly. 5

Anchorage.—There is fairly good anchorage westward of the point in from 7 to 10 fathoms water, with the casuarina wood bearing 166° true. 10

Chart 1353, Diamond point to Pulo Berhala.

OFF-LYING BANKS.—**Deli bank** is the general name of the banks situated within the 10-fathoms contour line, with its north extreme about 10 miles east-north-eastward of Deli light-vessel, and from thence trending 22 miles south-eastward, to its south extreme, which lies about 9 miles north-eastward of Sijengi point. 15

Bunja shoals are situated on the south-eastern part of Deli bank, and consist of two parallel ridges of sand. The northern ridge (*Lat. 3° 47' N., Long. 99° 5' E.*), with depths of from 1½ to 3 fathoms, is 4 miles in length, in a north-west and south-east direction within the 3-fathoms contour line, with a bottom of mud and sand and shells, tolerably hard. From the least depth, near its centre, Pulo Berhala bears 91° true, distant 25 miles; the eastern side of the bank is steep-to. 20

The southern ridge, at about 2 miles south-westward of the northern, with depths of 3 feet to 3 fathoms, is 4½ miles in length, within the 3-fathoms contour line, the least depth being near its centre. The shallow portions of both ridges are generally marked by tidal-rips, and with any swell these will break. Between these shoals and the bank fronting the shore, rippings and discolouration of the water are frequently observed. 25 30

Buoys.—A conical buoy, painted black and white in vertical stripes, and surmounted by a staff and black ball, is moored in 3½ fathoms water near the north-west extreme of the outer ridge.

The south-east extreme of the southern ridge is marked by a conical buoy, painted black and white in horizontal stripes, and surmounted by a staff and white ball, moored in 2½ fathoms. 35

Clearing marks.—In the absence of the buoys, Pulo Berhala bearing 96° true leads one mile northwards of Bunja shoals, and the same object bearing 79° true leads southward of them. The west extreme of the casuarina trees on Ujong Sibunja Bunja bearing 185° true, leads westward, and bearing 250° true, leads south-eastward of them, but with depths of 4½ fathoms or probably less inshore 40

General chart 1355.

Chart 1353, Diamond point to Pulo Berhala. Var. nil.

of the southern ridge. It is not advisable to stand into less depths than 18 fathoms when passing these banks at night.

- 5 **Sijengi ridge**, about 4 miles in length, lies parallel to the coast and 2 miles distant from the mouth of Sijengi river; the least depth is $1\frac{1}{4}$ fathoms, over tolerably hard sandy bottom, with depths of from 4 to 6 fathoms between it and the shore. Isolated patches of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms lie between it and Bunja shoals.

Chart 794, Pulo Berhala to Cape Rachado.

- 10 **Mati bank**, the western extreme of which is about 2 miles north-eastward of Tanjong Tanjung, and about 13 miles westward of Pulo Salanama or South Brother, lies parallel to the coast, and is about 8 miles in length, one mile in breadth, with a least depth of $1\frac{1}{2}$ fathoms. The 3-fathoms patch off its north-west end lies 35° true, distant $2\frac{1}{2}$ miles, from Mati point. It is composed chiefly of hard sand, and is steep-to in places.

Beting Neneh, a patch of $2\frac{1}{4}$ fathoms, lies $1\frac{1}{2}$ miles south-eastward of the south-east extreme of Mati bank.

- 20 **Clearing marks**.—The group of casuarina trees half a mile westward of Sungai Tanjung, bearing 205° true, leads a mile westward of the 3-fathoms edge of Mati bank.

- 25 **Outer Mati bank**, about 15 miles in length in a north-west and south-east direction, with a greatest breadth of 5 miles, has general depths of from 5 to 10 fathoms, with one patch of $4\frac{3}{4}$ fathoms, from which Tanjong Tanjung or Mati point bears 218° true, distant $7\frac{1}{4}$ miles; the bottom consists of mud and sand and shells; the mud being mainly volcanic ashes. Some discolouration is observable during the strength of the tidal streams.

- 30 **Tides**.—It is high water, full and change, at Tanjong Tanjung or Mati point at IIIh.; springs rise about 7 feet.

Tidal streams.—The flood or south-eastern stream runs from about 4 hours before until 2 hours after high water, and the ebb the reverse, at the rate of 2 to 3 knots at springs, respectively.

Chart 793, 794.

- 35 **PULO BERHALA or VARELA** (Lat. $3^\circ 46\frac{1}{2}'$ N., Long. $99^\circ 30'$ E.), lying about 22 miles north-eastward of Bedagei river, the nearest part of the island of Sumatra, is a capital landmark, being visible from a distance of about 30 miles in clear weather. By night also it can usually be distinguished at a fairly safe distance.

- 40 See view *b* on page 98.

Composed of rock thickly covered with vegetation, it is about 760 yards in length, in a north-east and south-west direction, by 660 yards in breadth, and the tops of its trees are 590 feet above high water.

General chart 1355.

Charts 793, 794. Var. nil.

It is steep-to on the north-east and south-west sides, but the 10 fathoms contour line is distant about 6 and 8 cables, respectively, from the north-west and south-east sides.

A wooded islet, 157 feet high to the top of its trees, lying three-quarters of a cable from its south-east point, is connected with the island by a coral ridge dry at low water; at half a mile north-west of Berhala is a similar rocky islet, which shows white in places, and is 167 feet in height to the top of its trees; there is a somewhat large grotto in it. Between Berhala and this islet there are depths of from 5 to 7 fathoms.

A coral reef, extending from half a cable to one cable, fronts the south sides of Berhala (not charted), and has two sandy beaches separated by a rocky point, the eastern one of which affords the best landing; on the western beach a stream of water discharges in the rainy season. Natives of Sumatra visit the island from time to time to collect turtles' eggs.

Anchorage.—On the ridge extending south-eastward of Berhala, anchorage may be obtained in 9 fathoms, over sand and shells, at about 4 cables from the nearest point of the island.

Berhala bank, within a depth of 10 fathoms, is about 7 miles in length in a north-west and south-east direction by about one mile in breadth. The least water is 6 fathoms, with Pulo Berhala bearing 153° true, distant about 10 miles. It affords good anchorage over mud and sand.

Five miles southward of Berhala is another ridge, with a minimum depth of 8 fathoms.

Discoloured water.—Phosphorescence.—The water is discoloured over these banks during the strength of the tidal streams, and there are occasional tide-rips. Strong tidal streams in conjunction with rapid changes in depth form troubled areas of water, whose upper surfaces often take the form of smooth eddying patches, followed by areas of broken water, giving a strong impression of shoals. This impression is strengthened by the fact that the vertical upward movement of the water brings mud from the bottom, and causes sharply-defined areas of discolouration. Off the shore banks and isolated shoals, as well as also off the mouths of the rivers, discoloured water is met with. At some places on the coast, as at Aru bay and Si Bunga Bunga, a strong phosphorescence is noticeable off the mud-banks fronting the shore, and where this bank is broad, as at Aru bay, it is much accentuated by a high wind, that the light so given off is said to be the best indication of the nearness of land.

General charts 1355, 2760.

Charts 793, 794. Var. nil.

Tides.—It is high water, full and change, at Pulo Berhala, at 11h. 45m.; springs rise about 7 feet.

A magnetic disturbance was reported in 1913, south-eastward of Berhala, in lat. $8^{\circ} 40' N.$, long. $99^{\circ} 43\frac{1}{2}' E.$

Chart 794, Pulo Berhala to Cape Rachado.

THE BROTHERS are situated 26 and 29 miles south-eastward of Pulo Berhala, in the track of vessels navigating along the coast of Sumatra. They are visible from 18 to 20 miles in clear weather, and being steep to beyond the distance of about $1\frac{1}{2}$ cables, would usually be seen at night in time to avoid them. They are uninhabited, but natives from Sumatra usually visit them in the turtle season, and for bamboos, which grow on Salanama, the southern islet.

Pulo Pandang (*Lat. $3^{\circ} 25\frac{1}{2}' N.$, Long. $99^{\circ} 45\frac{1}{2}' E.$*), the northern, is a thickly wooded rocky islet about 4 cables in length, consisting of two parts, the northern 223 feet, and the southern 121 feet high, connected together by a sandy ridge. The islet is surrounded by a reef to the distance of $1\frac{1}{2}$ cables in places, with some rocks above water on it.

Landing.—The best landing place, when there is no north-westerly swell, is on the small beach in the middle of the west side of the northern portion of the islet.

Water collects in a pit, near the landing place, during rains.

Anchorage.—On the ridge extending south-eastward of the islet a depth of 7 fathoms will be found at about 6 cables from it, but the holding ground is bad, and the sides of the ridge steep to.

Anchorage, however, may be obtained south-east or north-west of the islet, in 14 to 16 fathoms, over mud and sand, with the islet distant about 7 to 8 cables in both cases. On either side of these ridges, of which the islet forms the centre, there are depths of 22 to 25 fathoms.

Near the ridge connecting the two portions of the islet is a small creek where a boat may anchor.

Salanama (Salahnama), or South Brother, lies about 5 miles south-south-west from Pulo Pandang, and about 10 miles from Tanjong Timbun Tulang, on the coast. It is about 4 cables in length, and $1\frac{1}{2}$ cables in breadth, and the tops of its trees attain a height of 298 feet. The island is densely wooded with trees and ferns, and its rocky sides rise steeply from the sea.

A rock, 26 feet high, lies about $1\frac{1}{2}$ cables northward of the islet, at about a cable south-east of it is a rock dry at low water. A rock 39 feet high is situated $4\frac{1}{2}$ cables east-south-east from the south point of Salanama; beyond the distance of a cable the islet and rocks are free from danger.

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

Landing.—A small beach, covered at high water, on the south-east side, offers the most practicable landing.

Anchorage.—Temporary anchorage, in from 13 to 14 fathoms, will be found on the south-east and north-west sides of the islet at a distance of about 7 cables, in the latter case with the highest part of the island bearing about 135° true. The islet affords no fresh water. 5

Tides.—*See* Tides, Batu Bara, page 112.

Tidal streams.—Near Pulo Pandang the flood and ebb streams set south-eastward and north-westward, respectively. 10

COAST.—General remarks.—The character of the coast between Tanjong Tanjung or Mati point and Sungai Asahan is similar to that described on page 113; it is without exception low and covered with vegetation. The Brothers, in the offing, the mouths of the Batu Bara and Asahan, which are lighted and beacons, and Tanjongs 15 Tanjung and Timbun Tulang, when near the coast, are the only objects readily identified.

Fishing stakes may be found as far off shore as a depth of 5 fathoms.

Aspect (*continued* from pages 97,98).—*See* views on pages 87 and 98. From 45 to 50 miles within the coast the Batak mountains extend in a south-easterly direction until abreast or south-west of Sungai Panei, eastward of which there is no further trace of mountains to be seen from the offing. The most noticeable are a broad mountain ridge within Batu Bara with two flat summits, each about 7,300 feet high, eastward of which is a conical peak, 7,054 feet high, and here the range terminates. Nearer the coast is a noticeable sharp peak 5,906 feet high, eastward of which the height of the range increases to the Asahan range. 25

Mount Surungan (*Lat. 2° 27' N., Long. 99° 21' E.*), 7,250 feet high, is the highest and the most south-easterly peak of the Asahan range; it is fairly sharp, sloping on the west and precipitous on the east side. 30

Kwalu range.—At 17 miles southward of Surungan, is the highest point of the Kwalu range; it is very noticeable, being conical and 7,677 feet high. A little eastward is a sharp-sided hummock 6,988 feet high, conspicuous when bearing about south; south-eastward of it is a conical peak 6,922 feet high. 35

Gunong Si Gumpulan (*Lat. 2° 5' N., Long. 99° 30' E.*) range has some flat tops. The highest peak is 6,496 feet, and the two others are 6,200 and 6,130 feet high. 40

The peaks of the Asahan, Kwalu and Bila ranges may be seen in clear weather as far south-eastward as off the Rokan river. They are usually visible in the early morning, but less so in the months of February to May than in the other months of the year. 45

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

COAST.—Between Tanjong Tanjung and Sungi Batu Bara, a distance of $9\frac{1}{2}$ miles, the coast is fronted by a white sandy beach for the whole distance, with the exception of the bank of mud and mangroves northward of the Sungi Gambus.

The bank, which dries off-shore for a distance of half a mile or more in places, is generally firm mud mixed with sand, and may everywhere be approached by the lead, but the north-east edge of the bank off Tanjong Timbun Tulang is somewhat steep-to. The bottom consists of mud, sand, shells, rock and coral; the two last named being found chiefly near the island.

The Gambus, Perupuk, and Piai streams are only available for very small trading craft or boats, the mouths being all dry at low water. A few huts are visible from seaward, near the Gambus and Perupuk.

Sungi Bafu Bara is the common mouth of the Sungi Kanan and Sungi Kiri, two streams which connect at the settlement of Tirem, about 6 cables above the entrance; in the channel, over the bank fronting the entrance, there is a depth of one foot at low water, spring tides. The anchorage space is scanty near the settlement. On the eastern side of the channel the shore bank dries off about 8 cables. Vessels of 8 feet draught can enter at high water, spring tides.

Beacons.—One stake beacon, surmounted by a white ball, marks the starboard hand, when entering, and two stake beacons, with black truncated cones, the port hand.

Two leading beacons are erected on the eastern side of the mouth; the front one is surmounted by a triangle point upwards, and the back one by a triangle point downwards. These in line, bearing 170° true, lead in to the outer black truncated beacon; thence steer for the inner black beacon. The white beacons are to be removed, excepting the outer one.

LIGHT (*Lat. $3^\circ 14' N.$, Long. $99^\circ 35' E.$*).—A light is exhibited on the west side of the entrance from a white iron open framework 42 feet in height. See Light list.

Fishing stakes are placed in depths of about 4 fathoms, about $3\frac{1}{2}$ miles northward of the entrance.

Settlements.—Tirem is chiefly inhabited by Chinese, and has a Custom-house. The Controller of the district lives at Labuan Ruku, a short distance inland, which place is connected by a good road with Bedagei and by another to Tanjong Balei and the Asahan river.

Communication.—There is regular communication by steam vessels with Penang, and some traffic is done by small coasting steamers.

Tides.—It is high water, full and change, of the semi-diurnal tides, in Sungi Batu Bara, at IVh.; springs rise 7 feet, neaps $2\frac{1}{2}$ feet; the tides are subject to irregularities. High water of the diurnal tides occur as follows:—1st January at XIh. p.m.; 1st April at Vh. p.m.;

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

1st July at XIh. a.m.; 1st October at Vh. a.m., with a rise of one foot. In the second half of June and December the rise increases to 2 feet, and decreases to half a foot. The highest water levels are reached in the middle of April and October at IVh. a.m., and IVh. p.m., respectively, and in the latter half of January and July at Xh. a.m. and p.m. 5

COAST. — Between Sungi Batu Bara and Timbun Tulang, 10 miles eastward, the sandy beach forming the coast is here and there interrupted by mud and mangroves, the whole backed by trees of uniform height. Some unimportant streams discharge here, amongst which are the Bagan Batak, 6 miles eastward of Batu Bara, and the Timbun Tulang at half a mile westward of the point of that name; their mouths dry at low water; farther eastward the coast is uninhabited. 10 15

Tanjong Timbun Tulang (*Lat. 3° 10' N., Long. 99° 45' E.*) is low and wooded, and at the mouth of Sungi Timbung Tulang there is a fishing village, visible from seaward from a distance of about 10 miles, which serves to distinguish the point. The shore bank off this part of the coast dries at nearly half a mile on an average. 20

Timbun Tulang bank extends north-north-westward for a distance of $5\frac{1}{2}$ miles from the point, and in a north-easterly direction for $4\frac{1}{2}$ miles, with depths of one to 3 fathoms.

Clearing mark.—Pulo Salanama, bearing 320° true, leads one mile north-eastward of the bank. 25

Fishing stakes.—There are fishing stakes, in depths of 3 to 4 fathoms, to the westward of the extreme of the bank and 4 miles from the shore; also south-eastward of the bank, as charted.

Coast.—From Tanjong Timbun Tulang to Sungi Asahan, the coast, chiefly composed of mud and mangroves, is fronted by a bank which dries off about half a mile. 30

The Sungi Silau Laut, a creek, discharges at $3\frac{1}{2}$ miles south-eastward of Tanjong Timbun Tulang.

SUNGI ASAHAN.—Bar.—Sungi Asahan, situated 7 miles south-eastward of Silau Laut creek, is half a mile wide at its entrance between Tanjong Napal and Tanjong Jumpul, both low mangrove points. The direct and buoyed channel over the western part of the Jumpul bank fronting the shore of the entrance to Sungi Asahan has a minimum depth of 3 feet at low water, and 13 feet at high water spring tides, over a bottom of hard sand. 40

The western channel, which is 5 feet deeper, or with about 8 feet at low water, and 18 feet at high water springs, lies between the western edge of Jumpul bank and the shore northward of Tanjong Napal; the two channels meet abreast the white buoy off that point;

Général charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

both sides of the western channel are marked by stakes, which are sufficient guide for those acquainted with it.

The depths in the river above the junction of the two channels are
5 from one to 3 fathoms, but there are places with only a depth of 3 feet at low water going up to the settlement.

Jumpul bank.—The mudbank dries off nearly 2 miles northward of Tanjong Jumpul, and with less depths than 3 fathoms to about 6½ miles, known as Jumpul bank. The inner part of it, with depths
10 under one fathom, extends across the approach to the river for a distance of 4 miles from the point, nearly to the western shoal mudbank, with the western channel between.

Jumpul bank is steep-to, and should be given a wide berth, in not less than 12 fathoms; its edge is usually marked by discoloured water.

15 Fishing enclosures are erected on the banks and in places close to the buoyed channel; the northernmost is in 22 feet, east side of the entrance to the buoyed channel.

Buoyage.—The direct channel over Jumpul bank is marked by white conical buoys on the starboard hand, and black can buoys on
20 the port hand. The outer white conical buoy lies 4½ miles northward of the lighthouse, and the outer black can buoy 1¼ miles southward of the white buoy.

LIGHTS (*Lat. 3° 1' N., Long. 99° 51' E.*).—A light is exhibited from a white iron framework at the north end of the fishing village,
25 situated one mile southward of Tanjong Napal, west side of the entrance of the river.

Beacon lights.—Leading beacons for the several reaches, from which lights will shortly be exhibited, indicate the fairway of the river within the entrance, for those with local knowledge. See Light
30 list.

LIGHT (*Lat. 3° 1' N., Long. 99° 51' E.*).—At the north end of the fishing village, situated one mile southward of Tanjong Napal, west side of the entrance of the river, a *white fixed* light is exhibited from a white post at an elevation of 42 feet above high water, visible,
35 in clear weather, from a distance of 11 miles between the bearings of 182° to 244° true, or over the approach.

General directions.—See page 89.

Directions.—These directions for the river should only be used by the smallest of vessels, and only when the services of a pilot are
40 not obtainable. Coming from the westward, Pulo Salanama should be kept bearing about 313° true astern, to pass northward of Timbun Tulang bank, until the fishing huts on the point of that name bear 230° true, when, if entering by the buoyed channel, the outer fishing

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

stakes, in 22 feet, on the north end of Jumpul bank and on the east side of the channel, should be steered for.

Thence about 194° true into the river between the white and black buoys, and farther in as indicated by the cross mark leading beacons for the channel of the river above. Lights are shortly to be established on these beacons. 5

The western channel is 5 feet deeper, and its sides are marked by fishing stakes, but there are no buoys. Tanjong Napal should be approached bearing 165° true; the track is then apparently west of two groups of fishing stakes, and then eastward of the white buoy off Tanjong Napal. 10

Local knowledge is necessary above the lighthouse, and the services of a man acquainted with the river could possibly be obtained from Kampong Besar, the fishing village near the lighthouse. 15

Coming from the eastward, Tanjong Timbun Tulang should be kept bearing westward of 278° true, which leads northward of Jumpul bank, until abreast the northernmost fishing stakes, in 22 feet water at the northern extreme of Jumpul bank, whence course should be altered to pass between the outer white and black buoys, about 194° true, as before. 20

Tides.—It is high water, full and change, in the entrance, at about IVh.; springs rise about 10 feet, neaps 3 feet; the spring tide rises one foot higher in the second half of March and September, and one foot less in the second half of June and December. At the settlement the spring rise is one foot less, and the time about half an hour later. 25

Tidal streams.—Outside the bar the flood runs from south-east to south-south-east at the rate of $1\frac{1}{2}$ knots, and the ebb north-north-westward and more northerly attaining a rate of 2 knots. During neap tides the streams are weak and irregular, and overcome by the river stream. Near the outer buoy the ebb sets north-west and flood south-eastward. 30

The flood makes in the entrance at 5 hours before high water, and the ebb at about 6 hours later; the flood attains a rate of $1\frac{1}{2}$ knots and the ebb 3 knots at springs, increased by freshets. 35

Settlement.—Tanjung Balei (Balai), the chief town of the district of Asahan and residence of the Controller, is situated about 7 miles above the mouth of the Asahan, at the junction of that river with the Silau. The river here is about 40 yards wide, with low water depths of from 7 to 10 feet, but it is very shallow just above. 40

Pier.—Small coasting craft can lie alongside the iron pier.

Communication.—The Netherlands Royal Packet Company's coasting steamers, running between Singapore and Deli, call about

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

every fortnight, also frequent and regular communication by small steam vessels with Penang, which come up to the settlement; there is a post and telegraph station. *See* Communication, Chapter I., p. 18.

- 5 The road, some 160 miles in length, connecting the several settlements, begins here and ends at Pankalan Brandan. There is further communication by the numerous creeks. Rice, tobacco, and copra are exported, principally to Deli and Penang.

- COAST.**—From Tanjong Jumpul, the east point of entrance to
10 Sungi Asahan, the coast trends south-eastward for a distance of 8 miles to Tanjong Si Api Api, fronted by the mudbank, with depths under one fathom, to a distance of $5\frac{1}{2}$ miles off the former and to $1\frac{1}{2}$ miles off the latter.

- 15 Southward of Si Api Api, the coast forms a shallow bay 20 miles wide between that point and Tanjong Pertandangan. Into this bay the rivers Kwalu and Panei discharge their waters, but there are no other streams of any importance.

- 20 The coast is low, and in most places fronted by mangroves, similar to that described on page 113; there are a few fishing huts, but few objects for identifying it. The tree within Tanjong Bangsi, at the mouth of the Panei, and the village at Mendulang are conspicuous objects. The ranges of mountains, about 40 miles inland, are visible in clear weather. *See* views on page 87.

- 25 Tanjong Ludam and fishing station, with some rather tall trees lying near it, is situated about 6 miles south-eastward of Tanjong Jumpul; between are the Ular, Betul, Undan, and Sarong Alang, very small streams; the latter is the largest, and has a village half an hour's journey up stream.

- 30 Between Tanjong Ludam and Tanjong Si Api-api is the Sembilan stream, which may be known by the white beach and fishing huts at its mouth.

- Tanjong Si Api Api** (*Lat. $2^{\circ} 56' N.$, Long. $99^{\circ} 59' E.$*) is a sharp well-defined point overgrown with mangrove trees of moderate height, and is clearly distinguishable up to a distance of 10 miles on
35 south-east and westerly bearings. The Si Api Api, a very small stream, discharges here, and is marked by two huts at its mouth and a white beach southward of it. The mudbank southward of it stretches off about $2\frac{1}{4}$ miles, and is steep-to.

- SUNGI KWALU and PANEI approaches.**—The
40 approach to these rivers lies between Tanjong Si Api Api and Tanjong Pertandangan, and is about 20 miles across. It is much encumbered with banks, dry in places, formed by the deposits from these rivers, but there are deep channels between leading to the mouths of the rivers, one of which, West channel, leading to the Panei, is partly
45 buoyed.

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

Fishing enclosures are erected in several places on the banks and on the sides of the channel, useful marks for local craft.

Anchorage may be obtained anywhere outside the banks, according to draught. 5

Panei bank extends 10 miles off the mouth of the Kwalu and Panei, and about 4 miles seaward of a line joining the points of the approach; the bottom is mud and sand and shells, large portions of it dry at low water, and numerous fishing enclosures are erected on it; being steep-to on its eastern side, it should be approached with 10 caution.

Coast.—Ledung.—From Tanjong Si Api Api the mangrove coast trends southward for 11 miles to Ledung river and village, situated on the west side of entrance to Sungi Kwalu, and marked by a depression in the line of trees. The Ledung has a low water depth 15 of 2 feet.

A native collector of taxes resides at Ledung village, on the south side of entrance to the Ledung.

About midway between Tanjong Si Api Api and Sungi Ledung is the Chinese fishing village of Si Mendulang, on the south bank of the stream of that name, where there is a white beach. The village, visible 20 from a considerable distance in the offing, is a useful mark, as elsewhere there is only an occasional hut at the mouths of the several unimportant creeks on this coast.

SUNGI KWALU discharges in the western corner of the bay, 25 abreast Ledung; it is $2\frac{1}{2}$ miles wide, but quickly narrows to less than one mile at the first bend, and within it is narrow and somewhat tortuous. The channel is not buoyed.

The bar, with a depth of 6 feet at low water, and 18 feet at high water, spring tides, lies close off the mudflat fronting the western shore, 30 midway between Tanjong Si Babi and Tanjong Ledung.

Directions.—From the northward, Tanjong Ledung, west side of the mouth of Kwalu, should be kept well open of Tanjong Si Babi, to avoid the mudbank extending off Tanjong Si Api Api; from thence the course is about parallel to the shore; it is not advisable to offer 35 directions for a channel which has neither buoys nor good leading marks. The least depth appears to be about 7 feet; the tidal streams run very strongly in the entrance.

From the eastward, the course should lead about 2 miles northward of the black light-buoy on Panei bank. 40

Steam launches and small trading craft only visit the river.

SUNGI PANEI (*Lat. $2^{\circ} 41' N.$, Long. $100^{\circ} 7' E.$*).—The mouth of Sungi Panei is about 3 miles wide between Tanjong Datu and Tan-

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

jong Bangsi, the two low mangrove points forming its entrance, but 10 miles above it is reduced to about two-thirds of a mile, where it is joined from the westward by Sungai Bila. Labuan Bilik, the settlement, is situated about 2 miles above the junction, on the eastern bank of the Panei. The least depth between the sea and the settlement is 18 feet at high water, spring tides, abreast Sungai Njiri Kechil, 4 miles above Tanjong Datu.

The shores of the river are mangrove up to Berombang, and in the high northward of Tanjong Berang Berang Tunggal, as well as south-eastward of that point, and at Kantan island abreast of Labuan Bilik. The remainder of the banks of the river are firm ground overgrown with tall trees, and steep-to. Coconut trees are growing on either side of the many little villages on the banks.

Channels.—The mudbanks fronting the mouth, with depths of one fathom to 3 fathoms, extends about 12 miles northward of the entrance; its outer part is known as Panei bank, before described; the Middle bank, about 5 miles in length, and the bank westward of it are steep-to, and dry about 6 feet. Between the banks which dry, there are four channels into the river; Panei channel lies close westward of the Middle bank, and Bangsi channel eastward of the Middle bank. West channel is the only one now in use.

East channel is sometimes used by small craft from the eastward, well acquainted with it. Tanjong Bangsi, bearing 228° true, leads to its entrance. The least depth is about 7 feet, but there is as little as 4 feet farther in, abreast Sungai Dua.

West (Telok Piai) channel has a least depth of 7 feet, and is situated close eastward of the mudflat extending northward of Tanjong Perapat; being partly buoyed it is easily navigated by local traders; the banks on both sides are steep-to.

Light-buoys and beacons.—A buoy showing an *occulting white* light is moored in the approach to West channel at $6\frac{3}{4}$ miles northward of Tanjong Perapat, in about $2\frac{3}{4}$ fathoms on a narrow spit, in lat. $2^{\circ} 50' N.$, long. $100^{\circ} 4\frac{1}{2}' E.$

A similar light-buoy is moored on the edge of mudflat extending eastward of Tanjong Perapat.

A cross beacon, painted white, with a topmark, is situated $1\frac{1}{2}$ miles southward of Tanjong Datu, and another at Tanjong Berombang.

Directions.—Only those locally acquainted should attempt the entrance.

The entrance may be identified from the offing by the trees at Tanjong Bangsi, 207 feet in height, by the fishing huts at Mendulang, and the prominent point of Si Api Api, on the western side of the approach.

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

Having made the outer light-buoy (black), the course through West channel from about 3 cables eastward of the light-buoy is 187° true, heading for the light-buoy off Tanjong Perapat, in not less than 19 feet at high water, spring tides, passing close eastward of the buoy, and from thence alongshore at the distance of about 3 cables, to Tanjong Datu, in about the same depth of water. From abreast Tanjong Datu continue along the western shore, avoiding the fishing stakes, and when nearing the cross beacon southward of that point steer to the south-eastward across the bar, in not less than 5 feet at low water, towards the cross beacon near Tanjong Berombang, and thence along the eastern shore to Tanjong Lumut. 5 10

When within 3 cables of the eastern shore steer along it, passing within half a cable or less of Lumut village. Here the channel is narrow, unbuoyed, and the banks westward of the track are steep-to. Off Tanjong Lumba Lumba spit, the turning point of the river, there is a low water depth of 4 fathoms, whence to the settlement the northern bank must be kept. Off the settlement there are low water depths of 2 to $2\frac{1}{4}$ fathoms. The tidal streams are strong. 15

Tides.—It is high water 2 days after full and change, at Labuan Bilik at VIh., with a mean rise of $11\frac{1}{2}$ feet, and half an hour earlier at the outer light-buoy in the approach; neaps occur 2 days after quadrature, with a rise of 5 feet. In the second half of March and September the rise at springs is increased to 13 feet; in the second half of June it is 10 feet. 20 25

Tidal streams.—The flood and ebb streams run for 5 and 7 hours respectively at 2 miles within the entrance, but at Tanjong Lumut and Labuan Bilik the flood runs for 4 hours only, and the ebb for 8 hours, the former turning at half an hour after high water by the shore. The flood, or south-east-going stream, off the entrance makes at about 5 hours before high water, and attains a velocity at springs of $2\frac{1}{4}$ knots an hour, the ebb running $3\frac{1}{4}$ knots. Between the entrance points they run 3 and 4 knots respectively, and at about one knot less in the approach; up river, off Lumut and Lumba Lumba both flood and ebb attain a rate of 4 to $4\frac{1}{2}$ knots at springs; near the shore between these places there is a counter stream during the first of the flood. There is very little slack water at springs. 30 35

Fishing stakes.—There are several fishing enclosures and stakes on the banks on either side.

Anchorage.—The usual anchorage is near the mole of the Collector of Customs just below the settlement, where, very close in shore, there are depths of 12 to 15 feet, but vessels of that draught would have to moor head and stern. 40

General charts 1355, 2760.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

Settlements (*Lat. 2° 31' N., Long. 100° 10' E.*).—The settlement of Labuan Bilik, the residence of the Controller, is situated on marshy and barren land, and is of little importance; the people are partly
 5 Malay, partly Chinese, chiefly occupied in the fisheries; the native ruler of Panei resides near the settlement.

Labuan Batu is situated on the same bank of the river, about 31 miles above Labuan Bilik.

Quarantine.—Pulo Kantan is the quarantine station for
 10 Labuan Bilik.

Communication.—The smaller steamers of the Netherlands Steam Packet Company call here every fortnight, and other small steamers and other coasting craft carry on the trade with other parts of Sumatra and Penang, &c.

Upper river.—The Panei is navigable above Labuan Bilik in the dry season for vessels of 6 feet draught as far as Ayer Mera plantation, which can be reached in 11 hours by a vessel making 8 knots, on a flood tide. Above this point navigation is impossible. In the rainy season Ratau plantation can be reached; distance not
 20 stated.

Sungi Bila (*Lat. 2° 31' N., Long. 100° 8' E.*), which joins the Panei below Labuan Bilik, has a depth of 6 feet at low water, spring tides, in the channel between the bank fronting Tanjong Berombang Tunggal and the bank in the centre of its mouth; Si Jawi Jawi is the
 25 settlement on the western side, at 2 miles above. There is barely a foot of water off the settlement at low water springs, rendering it inaccessible at that time.

Above the settlement the river is winding and in places shallow. But as the rise of tide is considerable for some distance, about 10 feet,
 30 it is available with local knowledge for vessels of light draught.

Winds.—Rain.—In addition to what has been stated in regard to the prevailing monsoons, &c., in the first chapter; in the neighbourhood of the Sungi Panei, persistent winds of some strength and duration, especially south-easterly, were more observable; during the
 35 surveying operations in the month of May, these south-east winds prevailed for several days, the direction by day being more from seaward, and at night more from southward, at which time the atmosphere was slightly hazy. Sumatras were less frequent than more to the westward, and their direction more from south than west. Hard
 40 squalls from south-east with rain were frequent. Rain occurred in all months, but chiefly from August to November.

COAST.—The coast between Tanjong Bangsi, at the mouth of the Sungi Panei, and Tanjong Pertandangan, about 5 miles to the east-

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

ward, consists of mud fringed with mangroves, similar to the coast westward of the Sungai Panei. Between are Bakau and Luwus, small streams, at the mouths of which are a few fishermen's huts. Eastward of Tanjong Bangsi is the conspicuous tree, 207 feet in height, before referred to. 5

Tanjong Pertandangan (*Lat. $2^{\circ} 42'$ N., Long. $100^{\circ} 14'$ E.*) is a low mangrove point, but well defined when seen from north-westward or south-eastward.

Bank.—The mudbank dries off-shore for a distance of 2 miles north-eastward of Tanjong Pertandangan, but from thence to near Tanjong Pechudian, nearly 12 miles south-eastward, it is less than a mile off-shore; off Tanjong Pechudian it again extends about 2 miles. From the latter point, a spit, with depths of from one to 3 fathoms, extends about 10 miles northward, nearly parallel to the coast, and may be approached by the lead, but off Tanjong Pechudian it is somewhat steep-to, and should not be approached under a depth of 7 fathoms. 10 15

Sitokan.—From Tanjong Pertandangan to Sitokan Kechil village, a distance of nearly 5 miles, the shore is all mangrove, with the exception of a low-water shelly beach just southward of Tanjong Pertandangan and a similar beach between the Pertandangan and the Keluang, two small streams. 20

A mangrove islet fronts the Sitokan stream, and a short distance from the entrance is the village of the same name. 25

Sitokan Kechil village lies $1\frac{1}{2}$ miles southward of the Sitokan, and is visible from the offing; southward of it, as far as the Tawar stream, tall trees stand close to the coast.

Tanjong Pechudian is fringed with mangroves, and as the tall trees backing this coast, when near it, decrease suddenly in height, it may be distinguished from some distance. The mudbank, which dries, extends for a distance of 2 miles off the point, and the water is shallow beyond. 30

Pechudian Besar and Pechudian Kechil, two small streams, discharge southward of the point and have fishing huts at their mouths and little shelly beaches; southward of the streams the shore is again fringed with mangroves. 35

Tanjong Penipahan (*Lat. $2^{\circ} 28'$ N., Long. $100^{\circ} 21'$ E.*), with village and stream of the same name, lies 4 miles southward of Tanjong Pechudian; the village is visible from some distance in the offing. The mudbank dries off nearly 2 miles between Tanjong Pechudian and this village, decreasing rapidly towards the latter, where it extends half a mile only, and is composed chiefly of sand and shells. 40

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

SUNGI ROKAN ESTUARY.—Coast.—From Tanjong Penipahan the coast, chiefly composed of mangroves, continues its south-easterly direction forming the western shore of the estuary of the

- 5 Sungi Rokan, in which are situated the Halang islets. Several small streams discharge on the coast, but there are no points of recognition beyond Chinese fishermen's huts at the mouths of the rivers Ular, Tenga, Pasir Limau Kapas, and Andam.

- Some cocoanut trees, the only ones on this coast, point out the
10 position of Pasir Limau Kapas (*Lat. $2^{\circ} 18\frac{1}{2}' N.$, Long. $100^{\circ} 24\frac{1}{2}' E.$*), and are possibly a useful mark when approaching the Rokan estuary from the westward.

- Halang islets**, formed by the growth of the mangroves on the mudbanks filling Rokan estuary, have banks, drying at low water, extending about 4 miles south-eastward of them.
15

Outer Halang, the northern islet, is 2 miles in length. Inner Halang is about $3\frac{1}{2}$ miles in length; southward of it is Telok Merbau settlement, situated about 5 miles above the entrance of the Kubu river, a small stream on the main island.

- 20 **A reef**, which uncovers, extends $2\frac{1}{2}$ miles in a north-westerly direction from the north-west extreme of Outer Halang, and a rock, with a depth of 3 feet, is situated one mile northward of the north extreme.

- Bank.**—Southward of Tanjong Penipahan, the shore bank dries off only about 3 cables, and the 3 and 5-fathoms contour lines, which run close together, are about $2\frac{1}{2}$ miles off-shore until about 2 miles southward of Tanjong Hantu, where a bank, 2 miles in length and lying $1\frac{1}{2}$ miles off-shore, dries at low water; southward of this the water gradually shoals to the river. There is a strong phosphorescence on the
30 water at night, especially near the shore banks.

- Northward of the peninsula forming the eastern side of the river, the mudbank, with depths of one fathom to 3 fathoms, extends about 20 miles north-westward; between this and the southernmost of the Aroa islands the depths are irregular, from $3\frac{1}{4}$ to 8 fathoms, with
35 isolated patches on which the depths are from $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms. There are a number of fishing stakes on this bank, some of which are dangerous at high water, being covered.

- Between Tanjong Belanda and Tanjong Senebui, 18 miles eastward of it, on the eastern side of the approach to the river, the mudbank
40 dries about $1\frac{1}{2}$ miles to $2\frac{1}{2}$ miles, and as charted.

Pulo Senebui, formed by mangroves growing on the mudbank, has a narrow passage between it and the shore, which extends the whole distance inside the latter mudbank. There is a small fishing village up

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. nil.

the Sungi Raja Berjamu, abreast the gap in the mudflats, which stream is three-quarters of a cable wide in the entrance.

The mudbank of this coast is reported to be extending, and the coast should not be approached within a distance of $2\frac{1}{2}$ miles. 5

Northward and eastward of Panjong Senebui are the South sands, described on page 226.

Fishing stakes.—Within the 3-fathoms contour line of the bank there are numerous fishing enclosures, and there are many fishing stakes covered at high water. 10

Charts 794, 1355.

Sungi Rokan is about 5 miles wide in its entrance between Bagan Si Api Api, the principal settlement, and the western shore. It is reduced to $2\frac{1}{2}$ miles abreast Labuan Tenga, some 9 miles above, and to less than one mile at Tanjong Beting, 8 miles above Labuan Tenga. 15
The shores on both sides are composed of mud and mangroves, and intersected by many small streams.

In the entrance, abreast Inner Halang island, the low water depth charted is apparently not more than 2 feet.

The river itself is much encumbered with banks, mostly quicksands, 20
and the channels between them are constantly shifting, rendering navigation hazardous, except to those with local knowledge.

Settlements.—**Bagan Si Api Api** (*Lat. $2^{\circ} 10' N.$, Long. $100^{\circ} 48' E.$*), fronting the eastern shore of the estuary of the Rokan, for a distance of 2 miles, takes its name from the quantity of 25
wood for fuel (api-api) which can be obtained there; it is the residence of a Controller who is the head of the Civil government, and the inhabitants, numbering about 10,000, are nearly all Chinese, who carry on the fishing industry in all its branches. It is famous for the quantities of fish and fish produce, in which connection it is one of the principal 30
places in the east.

Light.—A light is exhibited on the small pier at the settlement.

The settlement of Labuan Tenga is 9 miles, and that of Tanah Putih on the western bank about 33 miles, above Si Api Api; a native revenue officer resides at the latter settlement. (*Chart 1355.*) 35

Communication.—There is communication by steam vessels every fortnight to Asahan, Deli, and monthly to Bengkalis, Siak, and Singapore. *See also page 18.*

Trade.—For the export of the fishing industry 6 steam vessels maintain a regular service *via* Bengkalis and the inner channels to 40
Singapore, and also to Java. There is a customs and a number of loading piers.

Anchorage.—**Channel.**—There was formerly a depth of 11 feet at low water, spring tides, about half a mile off the flagstaff at

General chart 1355.

Charts 794, 1355. Var. nil.

Bagan Si Api Api. There is said to be a depth of $3\frac{1}{2}$ fathoms near the shore at $1\frac{1}{2}$ miles above the settlement.

5 From abreast the settlement there is a channel half a mile wide with a depth of 10 feet up to Leban point, or nearly to Labuan Tenga, 9 miles southward. The depth apparently is under one fathom a little higher up.

Patches.—The channel abreast the settlement is much narrower than when surveyed in 1893, and there is a drying patch at $1\frac{1}{2}$ cables 10 westward of Bagan Si Api-api, and a 4-foot patch south-south-west of it.

Directions.—The approach to the river is not buoyed; the depth over the flat appears to be about the same everywhere, as charted.

15 From the northward, the mudbank fronting the river may be approached by the lead, bringing Tanjong Belanda, the slight projection of the coast northward of the settlement of Bagan Si Api Api, to bear 180° true and steering for it. From the 3-fathoms contour line, Tanjong Belanda being distant about 10 miles, a course should be shaped to pass 2 miles westward of that point, which will lead in over 20 the flats in a depth of about 23 feet at high water, spring tides (6 feet at low water springs), until abreast Tanjong Belanda, whence the water is shallower; when abreast the south end of Bagan Si Api Api, haul in for it.

25 From the westward, having passed about 4 miles off Tanjong Pechudian and Tanjong Penipahan, course may be shaped to pass about 4 miles northward of the outer Halang islet and thence to the settlement.

Tides.—It is high water, 2 days after full and change, at the town of Bagan Si Api Api, at VIIIh.; springs rise 17 feet, neaps about 30 12 feet, and there are two high waters generally in the 24 hours.

Tidal streams.—The flood runs for 4 hours, and the ebb for 8 hours, at the rate of 5 knots at springs, at which time there is no slack water; the water rises about 4 feet in the first, 5 feet in the second, 5 feet in the third, and 3 feet in the fourth hour. The flood 35 stream is weak during neaps. The streams turn at high and low water by the shore.

On the mudflat off the Rokan, during springs, the tidal streams revolve against the hands of a watch; the maximum strength of the streams is from 3 to 4 miles, but nothing definite can be given as to 40 its direction; at springs there is scarcely any slack water. During neaps a north stream and a south stream are noticeable, of which the first-named is the stronger and runs the longer, and two days after the quartering of the moon it is very frequently the only stream.

General chart 1355.

Charts 794, 1355. Var. nil.

Bore.—From 3 days before until 3 days after full and change, the flood makes as a bore some 3 feet in height and with considerable noise and speed; it is a considerable danger to small trading craft and boats; and these usually wait under Labuan Tenga, 9 miles up, until the bore has passed up. Below Labuan Tenga it is not noticeable beyond a sudden rising of the water and a strong stream. Of late years the bore appears to have decreased in force, probably over-rated in the first instance.

Winds.—Near and eastward of the Rokan, the winds during the survey were very variable; in April and in November and December north-west winds, with rain, were prevalent, whilst in July and August the winds for the greater part were between east-south-east and north-east. Sumatras caused a disagreeable sea, which, however, did not last long. In July during four successive days a strong south-east wind was experienced. Rain fell in every month, the greatest rainfall being in April.

Charts 794, 795.

COAST.—Tanjong Senebui (Lat. $2^{\circ} 17' N.$, Long. $101^{\circ} 4' E.$) is the north-east extreme of the peninsula separating Sungai Rokan from Selat Rupert, from whence the coast trends south-eastward, forming the west side of approach to that strait. The whole of it to Tanjong Ketam is uniformly low and thickly wooded, overgrown with mangrove, the nipa palm and low brushwood. Behind the border of trees it is morass and entirely without inhabitants. Only near and westward of Tanjong Senebui are signs of life apparent, owing to the fishermen from the Rokan pursuing their calling here.

The eastern side of Tanjong Senebui is fairly steep-to, but to the south-eastward, between it and Tanjong Ketam, the shore mudbank dries from one cable to 3 cables off-shore.

Coming from the eastward from Bengkalis and Selat Rupert, along its westward shore, and approaching Tanjong Senebui, vessels should steer for the outer of the fishing enclosures off the point, hauling close round to avoid the sandbanks, on which is Senebui islet, covered with shrubs, off the point; thence close along the shore, keeping the lead going; the shore is steep-to at Senebui, but it soon becomes more flat, and off Raja Berjamu point, the shore mudflat occurs; here the channel is nearly dry at low water, so that it is only available for small craft after half flood.

When Tanjong Belanda bears 180° true, steer to pass 2 miles westward of it; the low water depth is not less than 6 feet. The banks southward of this route, along the coast west of Senebui, are said to be extending, but it possibly does not affect the channel inshore of them.

General chart 1355.

Charts 794, 795. Var. nil.

Off-lying banks.—Between Tanjong Senebui and the fairway of Malacca strait, there are a number of mudbanks, some of which dry at low water and break occasionally; they are the continuation south-eastward of the South sands, as far as and southward of Pyramid shoal; there is no navigable channel between them, but there is one along the Sumatra coast used by trading craft. The positions of these banks will be best understood by referring to the chart.

The bottom is fairly hard, and consists of sand, with here and there a layer of mud; the banks are all steep-to, with deep water between them.

Bakal Tua bank, within the 5-fathoms contour line, is 7 miles in length, $1\frac{1}{2}$ miles in breadth, and steep-to on all sides; it lies parallel to, and one mile distant from, the shore on the western side of entrance to Selat Rupert. The general depths over it are from 3 to 11 feet over hard sandy bottom, but two spots on it dry at low water.

Anchorage.—Good anchorage may be obtained in depths of from 6 to 12 fathoms, over sand and mud, along the whole of the western shore of the entrance of Selat Rupert, and in the channel within Bakal.

SELAT RUPAT (*Lat. $2^{\circ} 0' N.$, Long. $101^{\circ} 22' E.$*), the strait separating Pulo Rupert from the coast of Sumatra, is $4\frac{1}{2}$ miles in width at its northern entrance between Tanjong Ketam and Tanjong Mambol, and narrows to 2 miles in places; it is a convenient inshore channel for steam coasting craft trading between Singapore and the extensive fishing stations in Sungi Rokan, *viâ* Gelam strait.

Shores of the strait.—The whole of the south shore of Selat Rupert is thickly wooded, and there are no streams of any importance. The Sungi Dumai, the largest, is dry at low water at its mouth, but there are depths of from one fathom to 2 fathoms within; the population is very scanty.

At 12 miles westward of Tanjong Lebang is Puah village, situated in the space where the timber has been removed by burning and felling; it is visible from the strait, but Pulau Bongkok and Dumai villages, farther westward, cannot be seen. Two houses southward of Tanjong Lebang, and a somewhat conspicuous tree, 4 miles westward of Tanjong Lebang, are the only noticeable marks on this shore.

The coast of Pulo Rupert, on the north side of the strait, from its north-east extreme to as far as Tanjong Masim, its south-east extreme, is covered with low trees and brushwood and inundated at high water; within are tall trees with which the entire island, chiefly marsh, is completely overgrown.

Tanjong Tegoh, the south point, is shelving; Tanjong Lembu to the westward is marked by tall trees rising close to its extreme.

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

Batu Panjang village, the small houses of which are conspicuous, lies $5\frac{1}{2}$ miles westward of Tanjong Tegoh; elsewhere the coast is uninhabited, but here and there a few huts may be seen, which form the temporary dwelling place of a few Chinese or Malays who come here to cut timber. The small streams are of no importance. The islands in the strait are all covered with tall trees. 5

Depths.—Directions.—The depths vary in the channels between the banks, and between them and the shores on either side; southward of Pulo Ketam the channel over another bar has a depth of $3\frac{1}{2}$ fathoms, and as none of the channels are buoyed the strait should not be used without having local knowledge. 10

The channel generally used by coasting craft from Sungi Rokan is along the Sumatra coast for the whole distance, from Tanjong Senebui, at the north-western approach, to Tanjong Lebang at the eastern entrance, and westward of all the islands in the strait. The least depths are $3\frac{1}{4}$ to $3\frac{1}{2}$ fathoms at low water spring tides, in two places, namely, on the bar, which nearly connects Bakal Tua bank with the coast off the west point of the west entrance, and a similar bar which connects the south end of Pulo Ketam with the same shore. 20

Southward of Pulo Ketam are Atong, Pajung, Rampang, Jentileh, and the Mampu islands; in the channel between the last island and the Sumatra coast, there are depths of from 8 to 24 fathoms, and both sides are steep.

In the channel between Pulo Rupert and Pulo Pajung there is reported to be considerably less water than charted. 25

From Pulo Ketam (*Lat. $1^{\circ} 53' N.$, Long. $101^{\circ} 22' E.$*) the water is deep in mid-channel, with a general depth of about 12 fathoms.

In the eastern part of the strait two shoals, with about one fathom least water, lie about one mile off the north shore between Tanjong Tegoh and Batu Panjang village; and there are also patches about the same distance off the south shore eastward and westward of Puah village, but the channel is $1\frac{1}{4}$ miles wide between them. 30

After passing Tanjong Lebang the channel lies between the Sumatra shore and a shoal about 8 miles in length, with $1\frac{1}{4}$ fathoms least water, which is parallel to, and about 3 miles distant from, the shore. 35

The channel to seaward, north-eastward of Tanjong Lebang and of the bank of $1\frac{1}{4}$ fathoms referred to, and southward of an isolated shoal of $2\frac{1}{2}$ fathoms outside the coast bank of Pulo Rupert, has a least depth of 4 fathoms; thence out through Brewer strait. 40

Within the depth of 5 fathoms the shore banks are mostly steep-to, and the bottom consists chiefly of mud and sand, with hard clay in places; anchorage may be taken everywhere.

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

Tides.—The tides are semi-diurnal, and the highest water is from one to two days after full and change of the moon.

It is high water, full and change, in the west entrance of Selat
 5 Rupat at about Vh. 45m.; southward of the island at about VIh.;
 and at Tanjong Lebang in the east entrance at VIh. 30m.; springs
 rise about 12 feet in the west entrance and from 8 to 9 feet in the
 eastern entrance.

Tidal streams.—In the strait, the flood stream sets south-east,
 10 and the ebb stream north-west; the eastern entrance to the strait the
 flood sets east-south-east, and the ebb west-north-west southward of
 the island; in the strait by Dumai village, the ebb stream runs for
 from 7 to 8 hours, and the flood from 4 to 5 hours at full and change,
 the greatest rate of the former being 3 knots and of the latter
 15 2 knots; at the entrances of the strait the rate is about 2 knots.

Trade.—Some small coasting steamers use the strait, trading
 between Singapore and Bagan Si Api Api in Sungi Rokan, *via* Beng-
 kalis and Siak; occasionally small sailing vessels come here to cut
 and carry away timber, otherwise there is but little traffic through
 20 Selat Rupat.

PULO RUPAT, and Pulo Medang, lying northward of
 Selat Rupat, are separated by Selat Morong, a tortuous strait about
 one cable wide, with depths of more than 5 fathoms, but it is of no
 importance to navigation; its eastern entrance has a low water depth
 25 of 6 feet, and its western entrance 3 feet over a flat one mile wide.
 Both shores are thickly overgrown, and there are no inhabitants.

Together the two islands are nearly circular in shape, about
 26 miles in diameter, and the greater portion of them is morass with
 mangrove shores and tall trees within, the tops of which are visible
 30 from a distance of about 16 miles. Pulo Rupat, with the exception
 of its north-west extreme, has been described with Selat Rupat.

Sungi Nion (*Lat. $2^{\circ} 2' N.$, Long. $101^{\circ} 31' E.$*), a stream dis-
 charging on the north-west side of Pulo Rupat, is 2 cables in breadth,
 and has a depth of $2\frac{1}{4}$ fathoms, in its entrance, but it is blocked by
 35 the mudflat in its approach, upon which there is a depth only of from
 2 to 3 feet. Between the river and Tanjong Mambol, at the entrance
 to Selat Rupat, the coast is overgrown with trees to the high water
 line.

Pulo Medang.—Settlements.—The greater portion of Pulo
 40 Medang is low and wooded close down to the shore, which is composed
 chiefly of mangroves; on the north-eastern side there are some sandy
 beaches, casuarina trees and small villages in places; of these latter
 Batu Mamong (*Lat. $1^{\circ} 59' N.$, Long. $101^{\circ} 47' E.$*), 3 miles northward

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

of Selat Morong, is inhabited chiefly by Chinese, and one mile and 4 miles respectively from this are Kuku Burung and Makerau, and there is a hut on Tanjong Punah. Off the north-west coast there are small fishing settlements on Pulo Burung, Pulo Babi, and at Simpurn. 5

Beyond the distance of a mile the north-east coast is clear of dangers, with the exception of the bank, nearly dry at low water, which extends about $1\frac{3}{4}$ miles off-shore between Tanjong Makerau Besar and Tanjong Punah. The banks north-westward of the island, the continuation southward of South Banks, will be best understood by referring to the chart. 10

Tides.—Off Tanjong Medang, it is high water, full and change, at VIh.; springs rise 8 feet. Off the eastern entrance to Selat Morong it is high water, full and change, at VIh. 30m.; springs rise about 8 feet. 15

Tidal streams.—Northward of Pulo Medang the flood stream, setting from east-south-east to east, runs at the rate of 2 knots, and the ebb, setting from north-west to west, at about $3\frac{1}{2}$ knots; at neaps there is little or no south-eastern or flood stream appreciable. On the east coast of Pulo Rupert the flood stream sets more to the southward, along the land, and the ebb in a more northerly direction with rates of $1\frac{1}{2}$ and 2 knots respectively. 20

BREWER STRAIT. — Depths (*Lat. $1^{\circ} 41'$ N., Long. $101^{\circ} 53'$ E.*).—The approach from the northward to Brewer strait and Sungai Siak presents no great difficulty provided the buoys are in their proper positions, but it is not advisable to enter in other than a small craft without local knowledge. The water is deep, as below mentioned. The entrance, between Pulo Rupert and Pulo Bengkalis, is $17\frac{1}{2}$ miles wide, and between the banks extending from both those islands there is a channel 3 miles in width, with depths of from 8 to 16 fathoms, and over a breadth of about 6 miles there is not less depths than from $2\frac{1}{2}$ to 3 fathoms at low water. 30

At about 17 miles within Tanjong Jati is Selat Padang, on the eastern side, leading out to Malacca strait.

Beyond Tanjong Balai, Brewer strait is known as Selat Panjang, leading southward of Pulo Padang and Pulo Tebing Tingi, and is deep for about 60 miles, beyond which there are islets and shoals encumbering the strait. 35

Sungai Siak branches off from the western shore at about 10 miles within Tanjong Balai. 40

Banks.—On the western shore, from abreast the entrance to Selat Morong, a bank, with depths of from 2 to 3 fathoms, takes a general south-south-east direction for about 13 miles, its south extreme lying about 8 miles, in an easterly direction, from Tanjong Masim, whence

General chart 1855.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

it turns directly westward for Tanjong Tegoh, north side of Selat Rupert. Southward of it are the shoals mentioned with Selat Rupert.

A number of shoals, having patches with depths of from 2 to 5 fathoms, extends about 17 miles northward of Tanjong Jati, the east point of entrance, and 10 miles from that point they are 10 miles in breadth in an east and west direction; two patches, with depths of $2\frac{1}{4}$ fathoms over them, lie near the channel edge at about 5 miles north-west of the point, with other patches of 4 to $4\frac{1}{4}$ fathoms extending along the same edge for about 7 miles northward of them.

A patch of $4\frac{1}{2}$ fathoms lies 3 miles, 281° true, from Tanjong Jati. For others, *see* the chart.

Buoys.—A white conical buoy, surmounted by a staff and ball, is moored on the western side of the strait, just northward of a patch of $3\frac{3}{4}$ fathoms, at $4\frac{1}{2}$ miles south-eastward of Selat Morong entrance.

Black can buoys, the inner surmounted by a truncated cone, are moored westward of the northern ends of shoals with depths under 5 fathoms, on the edge of the 10-fathoms contour line, east side of the strait, at $10\frac{3}{4}$ miles north-north-westward and $3\frac{1}{2}$ miles westward of Tanjong Jati.

The western shore of the approach, on which there is but little noticeable southward of Selat Morong, has been previously mentioned, and Pulo Bengkalis, on the eastern side, will be described with the island later; the coast of that island, as seen from the strait, is of uniform appearance, and completely covered with trees and brushwood.

From Tanjong Jati, the eastern point of entrance, for a distance of about 20 miles eastward, the north coast of Pulo Bengkalis is fronted by shallow ridges parallel to the shore, and having generally deeper water between them; they present no danger to small vessels.

A bank with $2\frac{1}{4}$ fathoms least water lies $6\frac{1}{2}$ miles northward of Bantan Tenga village; during the fishing season, for about two weeks in the months of May and November, there may be as many as five or six hundred small craft engaged here in fishing.

Directions.—The approach from the north-westward is along the north-east coast of Pulo Medang, off which there are depths of 18 to 20 fathoms beyond the distance of one mile. From the eastward, pass on either side of Rob Roy bank, according to draught, but probably a vessel would approach Siak river from that direction *via* Selat Padang.

From a position about 3 miles off the village of Batu Mamong on Pulo Medang, a course about 170° true, allowing for the tidal stream, should be steered, and the white buoy, south-eastward of Selat Morong, passed on the starboard hand, checking the position by bear-

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

ings of Tanjong Masim and Batu Morong, thence passing westward of the two black buoys on the eastern or port side of the channel and within a mile of the inner one; thence the water is deep throughout Brewer strait. (*See Tides, pages 129, 135.*)

PULO BENGKALIS is 38 miles in length in a north-west and south-east direction, and 11 miles in breadth at its widest part, and from Tanjong Jati to, the west extreme of Tanjong Parit, the north-east point, the north coast trending in an easterly direction for 29 miles, is wooded, and has a generally monotonous appearance; midway between these points, on the north coast, is Bantan Tenga village, already mentioned.

From Tanjong Parit (*Lat. $1^{\circ} 31' N.$, Long. $102^{\circ} 27' E.$*), the north-east extreme, the coast has a south-east direction for 4 miles to Tanjong Sedekip, and then turns to the southward for 13 miles to Sekudi village, north side of east entrance to Salat Padang; it is fronted by a bank of sand and mud, extending about 3 cables from the shore, and is steep-to.

The Sungai Kambung empties itself southward of Tanjong Sedekip; although for some distance inside there are depths of from 3 to 7 fathoms there is only a depth of 3 feet on the bar, the entrance being a cable in breadth.

Sekudi village, situated near the south-east point, consists of about 10 small houses; from this point a spit of less than 3 fathoms, a small portion of which dries, extends in a southerly direction for a distance of about 8 cables.

Population.—There are a few Mohammedans at the capital, but elsewhere the inhabitants are pagans, and know little of land cultivation. Their chief employment is in fishing.

In May and November there is considerable activity around these islands for a couple of weeks, when hundreds of craft are engaged in the fishing for trubuk, a species of shad, whose spawn is a valuable commercial article, greatly sought after by the whole archipelago. The fish come to Bengkalis in shoals at various times of the year.

Depths off shore.—Between the east coast of Bengkalis and the Long bank in Malacca strait are a number of narrow sand-ridges, following the trend of the coast and channel, with least depths of about 2 fathoms, as charted. *See the chart.*

Tides.—It is high water, full and change, at Tanjong Jati, at VIIh. 15m.; on the north coast of Pulo Bengkalis at VIIIh.; on the east coast at IXh. 30m., springs rise about 9 feet, neaps about 6 feet. The highest water occurs from 2 to 3 days after full and change.

Tidal streams.—In the straits, between the islands, as outside, the flood stream sets to the south-eastward, and ebb to the north-west-

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

ward, the latter being always the stronger, especially at neaps, when there is sometimes no flood stream; on the east coast of Pulo Bengkalis, the streams sometimes attain a rate of nearly 2 knots an hour.

- 5 **Bengkalis** (*Lat. $1^{\circ} 28' N.$, Long. $102^{\circ} 6' E.$*).—On the north side of Brewer strait, about 11 miles south-eastward of Tanjong Jati, is Bengkalis settlement; an Assistant Resident is the head of the Government, and the inhabitants are principally Chinese and a few Moham-medans.

- 10 **Pier.—Light.**—There is a wooden pier about 400 feet in length, from the extremity of which a light is exhibited. *See Light list.*

Communication.—The Netherlands Royal Packet Company's steamers, running between Singapore and Deli, call monthly, going and returning.

- 15 **Anchorage** may be obtained from one cable to $1\frac{1}{2}$ cables off the pier, in depths of from 5 to 6 fathoms, over mud; it is recommended to moor.

Coal.—There is a small Dutch Government coal depôt here.

- 20 **Bukit Batu** is a village built on piles, situated on the Sumatra shore of Brewer strait, at the mouth of a small river of the same name, $5\frac{1}{2}$ miles westward of Bengkalis.

Anchorage may be obtained abreast of the river, in 12 fathoms, at about a mile off-shore.

Chart 1355, Malacca strait.

- 25 **SUNGI SIAK** (*Lat. $1^{\circ} 14' N.$, Long. $102^{\circ} 10' E.$*), entering Selat Panjang at about 8 miles southward of Tanjong Balei, in Brewer strait, is about half a mile wide at its entrance, in front of which, at the distance of 8 cables north of Tanjong Liang, the east side of the entrance, is a bar, three-quarters of a cable wide, with a depth of
30 $2\frac{1}{2}$ fathoms at low water, spring tides, and with but little less depth for some distance on either side of that breadth. The depths within are considerable, so that all vessels which can cross the bar can reach Siak, (Sri Indrapura), distant 39 miles above the mouth, and Pakan Baru 52 miles beyond. Tebing Tingi, a small town, is 38 miles above Siak.
35 Including boat navigation, its navigable course has been estimated at 150 miles.

The depths in the channels from Malacca strait are also greater than those on the bar. The best approach is eastward of Pulo Medang, by Brewer strait northern approach, page 129.

- 40 **Siak.**—A Controller is stationed at Siak Sri, or Indrapura, and there is a Dutch military station; the Sultan resides on the opposite shore. The trade is mostly in the hands of Chinese, the natives

General chart 1355.

Chart 1355, Malacca strait.

employing themselves in the cultivation of the land. Near Siak the river has a breadth of one cable, with depths of from 11 to 12 fathoms.

Pier.—There is a pier at Siak abreast the flagstaff of the Controller, with a depth of 2 fathoms. 5

Light.—A small light is shown on Siak pier when vessels are expected.

Communication.—The Netherlands Royal Packet Company's steamers, running between Singapore and Deli, call here frequently, 10 and also at Pakan Baru, both going and returning.

Pakan Baru.—From Siak to Pakan Baru, about 52 miles above, the river gradually narrows to about 90 yards, with depths of from 5 to 6 fathoms, and no hindrances to navigation, except snags. This place is the staple town of the forest products, and most of the trading 15 vessels entering Siak river load here. Craft should not anchor close to the shore on account of the number of tree roots, which cause the anchor to foul them.

Pier.—There is a pier on the right bank, with a depth of 9 feet off it at low water springs. A light is shown when a steam-vessel is 20 expected.

Above Pakan Baru the river slowly decreases in breadth, and sharp bends and snags render navigation difficult. H.N.M.S. *Flores* went 6 miles above Pakan Baru (draught not stated) with considerable difficulty. 25

In several places the banks are about 6 feet above high river, but within them the land is marshy; both shores are wooded. Tebing Tingi village, said to be 38 miles above Siak, stands on a hill about 100 feet above the river.

Trade.—The principal exports are rattans, wax, coffee, gambier, 30 honey, and tobacco, and the imports fish, manufactured goods, and petroleum.

Directions.—A bank dries at low water for a distance of 2 cables northward of Tanjong Liang, the eastern entrance point of Sungai Siak, and the bar is situated 8 cables northward of that point; entering, on 35 the flood stream, care is necessary against the strong cross set to the south-eastward. Having crossed the bar keep close along the eastern shore, where there are low water depths of $3\frac{1}{2}$ to 4 fathoms as far as the eastern point of Gunting island; here the depths over the whole river increase to $4\frac{1}{2}$ and 5 fathoms. Pulo Tenga or Saba, thickly wooded, and 40 situated about 5 miles above the mouth, has a mudbank, with depths of less than 2 fathoms, extending about 40 yards from its south-west side; the channel is on the eastern side of that island.

General chart 1355.

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

Up to the second bend above Pulo Tenga keep the western side to avoid a bank on the opposite shore; above this the depths are from 5 to 15 fathoms, the lesser depth being close to the shore, but it is
5 advisable to follow the bends and avoid the points, as in most river navigation.

General directions.—See page 89.

Tides.—At the mouth of Sungai Siak it is high water, full and change, at VIIIh. 30m.; springs rise 9 feet, and neaps 5 feet. Off the
10 town of Siak the spring rise is 10 feet. The water in this river is at times brackish in the dry season, but at other times it is fresh. The flood stream reaches up to Pakan Baru at times.

Tidal streams.—At springs the flood stream runs for 5 hours at a rate of about $2\frac{1}{4}$ knots, and the ebb stream for 7 hours at a rate of
15 3 knots; at neaps the flood and ebb run for 4 and 8 hours with rates of one knot and $2\frac{1}{2}$ knots respectively.

PULO PADANG, separated from Pulo Bengkalis by Selat Padang, and from Sumatra by Selat Panjang, is 32 miles in length in a north-north-west and south-south-east direction and 16 miles in
20 breadth at its central part; off Tanjong Padang, its north-west point, shallow water, with a depth of $1\frac{1}{4}$ fathoms, extends $2\frac{1}{2}$ miles in a westerly direction; and in the bend of the coast formed between Tanjong Padang and Tanjong Kelamin, 8 miles to the southward, the 5-fathoms contour line is about $1\frac{1}{2}$ miles off-shore.

The east coast of the island from the entrance of Selat Padang to the entrance of Selat Asam is fronted by a bank with a depth of less than 2 fathoms, extending for a distance of half a mile to one mile off-shore; a shoal, with less than 3 fathoms water, extends for the distance of 4 cables southward of Tanjong Majung, the south point
30 of the island, otherwise the coast is steep-to.

Selat Padang (*Lat. $1^{\circ} 26' N.$, Long. $102^{\circ} 12' E.$*), the channel between Pulo Bengkalis and Pulo Padang, leading south-eastward from Brewer strait, is used by small craft trading between Singapore and Bengkalis and Bagan Si Api Api. It is not less than 6 cables
35 in breadth, with depths of from 5 to 8 fathoms in the fairway through-out, and in most places there is a depth of 3 fathoms close to the shores, which are thickly wooded. At the eastern entrance the channel is contracted to a breadth of 4 cables, between the 3-fathoms contour lines, by shoals extending from each entrance point.

40 Dedap, a sandbank which dries (name not charted) lies on the south side of the strait; the deep channel is northward of it, but there is a depth of 4 fathoms to the southward.

General chart 1355.

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

Light-buoy.—A white buoy, exhibiting a *white flashing* light, is moored in the fairway of the eastern entrance to Selat Padang about $1\frac{1}{2}$ miles south-south-eastward of the northern entrance point; vessels should pass close south-westward of it.

5

SELAT PANJANG, the continuation south-eastward of Brewer strait from Malacca strait, commences from between Tanjong Padang and Tanjong Balai, and has a south-south-east direction for 33 miles to Tanjong Majung, the south point of Pulo Padang.

It is from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles in breadth, with fairway depths of from 8 to 13 fathoms as far as the junction of Selat Asam; but a bank about 5 miles in length, with a least depth of $5\frac{1}{2}$ fathoms, lies on the west side of the fairway abreast Makapan settlement.

10

From Tanjong Majung (*Lat. $0^{\circ} 54' N.$, Long. $102^{\circ} 22' E.$*), where it meets Selat Asam, it trends in a south-easterly and easterly direction, and is from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles in width, its depth varying from about 16 fathoms, in the western part, to only 4 fathoms near to, and to the eastward of Pulo Panjang.

15

Off the coast of Pulo Tebing Tingi, where the strait again turns to the south-eastward, and distant from it about $9\frac{3}{4}$ and $4\frac{1}{2}$ cables respectively, are Pulo Panjang and Pulo Baru; the former is overgrown with tall trees, and the latter with brushwood.

20

From the eastern end of Pulo Panjang, a narrow sandbank, following the trend of the channel, extends for a distance of 6 miles. At about 3 miles south-west of Pulo Panjang, is the west extreme of a sandbank which trends parallel to and southward of that island whence it joins the above bank.

25

Between the latter and the coast of Sumatra is a channel over one mile wide, with a depth of 4 fathoms.

On the Sumatra side, near the eastern entrance, are three small islands collectively known as Tiga islands; from them a spit of less than 3 fathoms, half a mile of which dries, extends to the north-westward for a distance of nearly 3 miles.

30

From here the channel, having a width of from 8 to 10 cables and a depth of $3\frac{1}{2}$ fathoms, follows the shore of Pulo Tebing Tingi towards the channel leading into Selat Ayer Itam.

35

A patch, on which there is $2\frac{3}{4}$ fathoms water, lies in the fairway to the southward of Pulo Tebing Tingi, at a distance of 7 cables from the shore.

Tides.—It is high water, full and change, at Bengkalis at VIIIh. 15m.; springs rise 8 feet. The tides are subject to diurnal irregularities, and the greatest rise occurs about 3 days after full and change of the moon. The highest water is experienced during the night in May and during the day in November.

40

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

In the eastern entrance of Selat Panjang high water occurs about 3 hours later, and the rise is 4 feet greater, than at Bengkalis. See also tides, page 129.

- 5 **Tidal streams.**—The flood stream runs in a south and east, and the ebb in a north and west direction, running tolerably regular at springs, but at neaps there is, as a rule, more ebb than flood stream; the greatest rate of the ebb recorded was 3 knots, and of the flood 2 knots an hour. In the eastern part of the strait the rate is nearly
10 4 knots an hour.

- Settlements.**—On the Sumatra shore, Lalang and Makapan settlements lie 20 and 25 miles respectively south-eastward of Tanjong Balai, and opposite the entrance to Selat Asam; the Sungai Rawa has a depth of 5 feet on its bar at low water, with 3 fathoms in the river
15 within; here there are saw-mills. On Pulo Padang, at Tanjong Kelemin is a wood-cutting establishment near which is a wooden pier; southward are the settlements of Dingkul, Lukit, and Majung. Both sides of the strait are covered with tall trees, and various spots stacked with timber will be seen, usually distinguishable by the small pier constructed near them, to enable vessels to go alongside to load.
20

- SELAT ASAM**, the strait between Pulo Padang on the west and Pulo Merbau and Tebing Tingi on the east, varies from three-quarters to more than a mile in width, with depths of from 12 to 30 fathoms. The shores are steep-to, except off Tanjong Majung, where it joins
25 Selat Panjang, from which point a spit, with depths less than 3 fathoms, extends about 4 cables to the southward. The only signs of habitation are an occasional hut or wood-cutters' shack in the middle of the dense vegetation.

- Tides.**—It is high water, full and change, in Selat Asam at
30 IXh. 45m. The tidal streams run at the rate of about $2\frac{1}{4}$ knots.

- Pulo Merbau** forms the eastern side of Selat Asam; its north-east coast between Tanjong Bohmat and Tanjong Hong Kong, a distance of 9 miles, is fronted by a mudbank that dries for a distance of 2 to 3 cables from the shore; beyond this a bank, on which is a
35 general depth of less than 2 fathoms, extends for several miles to the northward, as far as abreast the entrance to Selat Padang.

- Between this bank and that which extends off Pulo Rangsang, is the western fairway into Selat Ayer Itam; in the northern part of this fairway are several long narrow banks trending nearly north and
40 south, with depths of from $1\frac{1}{2}$ to 2 fathoms, making the navigation of this inlet troublesome for vessels of over 9 feet draught. The Selat Ringit separates Pulo Merbau from Pulo Tebing Tingi.

There are a few small houses, close westward of the Merbau stream (not charted).

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

PULO RANGSANG.—Tanjong Sampajan (*Lat. $1^{\circ} 9' N.$, Long. $102^{\circ} 44' E.$*) is the north point of Pulo Rangsang and along the west, north, and north-east coasts of this island a mudbank dries for a distance of from 2 to 4 cables. On the north and north-east coasts the 5-fathoms contour line follows generally the trend of the coast at an average distance of about 8 miles, with shoals of 2 to 3 fathoms within it. South-eastward of Tanjong Kedabu, between it and Tanjong Medang Kaluwar, the 3-fathoms contour extends nearly 8 miles off.

Close to the west coast is Pulo Sukul, on the mudbank. The south coast is separated from Pulo Tebing Tingi and Pulo Mangung by Selat Ayer Itam.

Tides.—It is high water, full and change, on the north coast of Pulo Rangsang at Xh. 0m., and on the east coast at Xh. 45m.

SELAT AYER ITAM (*Lat. $1^{\circ} 3' N.$, Long. $102^{\circ} 36' E.$*), with first a southerly direction between Tanjong Kong Kong and the west point of Pulo Rangsang, near which is Anak Setatah village, turns easterly and south-easterly southward of Pulo Rangsang, northward of Pulo Tebing Tingi and on both sides of Pulo Mangung and Pulo Topang, at the eastern entrance. It has an average width of between 8 and 12 cables, being wider at the eastern than at the western end; the depth decreases from 27 fathoms in the narrow channel near Tanjong Kong Kong to 6 fathoms near Tanjong Kemajau.

The eastern outlet is divided into two channels by Pulo Mangung and Pulo Topang, one channel running east and west, the other north and south. The former, which is barely $3\frac{1}{2}$ cables in breadth, is the deeper, the least water being about 4 fathoms in the eastern approach.

In the other and wider channel, a depth of not less than 4 fathoms can be carried by keeping close to the shore of Pulo Topang, as in the centre of the channel there is a depth of only $3\frac{1}{2}$ fathoms.

Leading into this channel on either side of the shallow bank extending to the northward of Pulo Serapung and Pulo Lebu are two channels, one, the narrower, $3\frac{1}{2}$ cables in breadth, close to Pulo Tebing Tingi, leading into the Selat Panjang, the other round the south end of Pulo Topang and northward into Selat Ayer Itam.

Two broad streams, the Sudur in Pulo Rangsang, and the Suwi in Pulo Tebing Tingi, empty themselves into this strait, the depth in both of these decreasing with their breadth; several small rivers and creeks also discharge into the strait.

Settlements.—The western part of the strait is the most populated. There is a Chinese settlement at Tebing Tingi (*Lat. $1^{\circ} 1' N.$, Long. $102^{\circ} 41' E.$*), westward of the Sungai Suwi, where

General charts 1355.

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

a Chinese official is stationed, and in other parts a few Malay villages, two of them, Beting and Belantik, being near the mouth of the Sungai Sudur; in the eastern part of the strait are only a few scattered houses
5 and several saw-mills.

Small steam craft, running between Singapore and Bengkalis, make use of this strait, calling at Tebing Tingi, from where a large quantity of sugar is exported.

Pier.—Light.—A small light is exhibited at the head of the pier
10 at Tebing Tingi.

Selat Ringit, between Pulo Merbau and Pulo Tebing Tingi, is less than half a cable in breadth, and has depths of from 5 to 7 fathoms. It is navigable for vessels of about 13 feet draught.

The bottom, both in these straits and outside the islands, consists
15 principally of mud and sand, in some places there is clay, whilst off Pulo Belembang and Pulo Burung stones were met with.

Pulo Mangung, Topang, Lebu, Serapung, and Mendol, situated off the entrances to both Selat Ayer Itam and Selat Panjang, are low, thickly wooded, and sparsely populated.
20 There are some timber sawmills scattered here and there.

Bank.—Eastward of Pulo Topang is a triangular bank about 8 miles in length in a north-east and south-west direction, with a maximum breadth of 3 miles; the depths on it vary from 2 feet to 3 fathoms.

Pulo Lalang (*Lat. $0^{\circ} 50'$ N., Long. $103^{\circ} 17'$ E.*) lies $3\frac{1}{2}$ miles
25 eastward of the bank just mentioned; it is a small islet surrounded by reefs, with a detached reef between it and the reef extending nearly 3 miles off Pulo Kundur. Detached reefs extend about 4 miles southward of Pulo Lalang.

Pulo Rusah is charted in the fairway of the channel leading
30 westward and southward of Pulo Kundur into Durian strait; it is a mere rock covered with shrubs. Pulo Turus, south-east of it, is a similar rock. Turus and Batu Lanjang reefs lie near these islets. The chart is on too small a scale to describe the dangers, and this
35 channel is only available for small craft, to and from Durian strait (Vol. II.) and the inshore channels leading to the westward through Selat Panjang, &c.

Tides.—It is high water, full and change, near Tebing Tingi settlement at Xh. 0m., and at the east end of Selat Ayer Itam at XIh. 0m.;
40 the rise gradually increases eastwards until off Tanjong Medang Dalam it amounts to 13 feet. Near Pulo Mangung the rise is 12 feet.

Tidal streams.—In the straits between the islands, as outside, the flood sets to the south-eastward, and the ebb to the north-west-

Chart 1355, Malacca strait. Var. $0\frac{1}{4}^{\circ}$ E.

ward, the latter, being almost always the stronger, especially at neaps, when there is sometimes no flood stream.

The rate of the stream, which, near the east coast of Bengkalis, runs nearly 2 knots, increases to the eastward until, near Pulo Belembang and Pulo Burung, it attains a velocity of $3\frac{1}{2}$ knots. 5

Chart 2660a, China sea. Var. nil.

Kampur river (*Lat. $0^{\circ} 28' N.$, Long. $103^{\circ} 10' E.$*) takes its rise in the mountain range of western Sumatra, empties itself on either side of Pulo Mendol, and has a channel along its eastern side, in a south-west direction, which is navigable for a distance of 18 miles from the sea as far as Pulo Mudu, above which navigation is difficult and dangerous; local knowledge is necessary. Owing to the bore and rapid tidal streams there is but little traffic in it. 10

Pilot.—A pilot for this river can be obtained from the village on the east side of Pulo Serapung. 15

Tidal streams.—On the south side of Pulo Mendol, at full and change, the tidal streams have rates of from 3 to 4 knots per hour.

Chart 1355, Malacca strait.

Pulo Burung, at about one mile northward of the bank mentioned with Pulo Topang on previous page, is fringed by rocks above and below water. 20

Pulo Belembang (*Lat. $0^{\circ} 53' N.$, Long. $103^{\circ} 14' E.$*) lies $1\frac{1}{2}$ miles northward of Burung, also surrounded by rocks above and below water. 25

Buoy.—A rock, with a depth of 2 fathoms, lies one mile north-eastward of Pulo Belembang, with a black can buoy on its north-east side, marking also the south side of the channel between Gelam strait and the channels between the islands to the westward.

Pulo Kenipaän, about one mile in length, lies $6\frac{1}{2}$ miles east-north-eastward of Belembang and 2 miles west of the north extreme of Pulo Kundur; the bottom between it and Kundur is foul. Between Kenipaän and Pulo Babi in Gelam strait are rocks above and below water. 30

Pulo Temblas, 277 feet high, lies 5 miles north-north-west of Kenipaän, in the fairway between Gelam strait and the channels between the islands south-westward of it. From a distance it appears as two islands. 35

Pulo Mudu, $7\frac{1}{2}$ miles northward of Pulo Temblas, and $1\frac{1}{2}$ miles off the west coast of Great Karimun, is 220 feet high, and from its south point a reef, that dries at low water, extends for a distance of 40

Chart 1355, Malacca strait. Var. nil.

about 7 cables, whilst on the western and north-western sides reefs extend half a mile from it.

- Pulo Assan** (*Lat. $1^{\circ} 8' N.$, Long. $103^{\circ} 19' E.$*), about one mile north-east from Pulo Mudu, and about the same distance off Great Karimun, is 280 feet high, and has on its north, west, and south sides several rocks and islets. *See view a on page 142.*

- Oxscar, or Pulo Tekong Belanda, the westernmost, apparently a high rock, lies about a mile north-west of the island; the north-easternmost danger is a rock with less than 6 feet water, at $1\frac{1}{4}$ miles north-east of the island. The rocks eastward of Assan are described with Little Karimun.

Chart 2403, Singapore strait.

- GELAM STRAIT** (*Lat. $0^{\circ} 58' N.$, Long. $103^{\circ} 26' E.$*) is the channel used by local craft trading between Singapore and Sungi Rakan, leading through the channels between Sumatra coast and the islands of Tebang Tingi, Padang, and Bengkalis, and also to the places in those channels.

- The strait lies between Pulo Parit and Tulang, off Pulo Papan on the south and the south extreme of Great Karimun on the north, and is $1\frac{1}{2}$ miles wide in its eastern entrance, but at 5 miles westward it is divided by Pulo Babi and the shoals adjoining it into two, the northernmost being buoyed, with apparently a narrow channel with from $4\frac{3}{4}$ to 5 fathoms least water in the fairway. The southern channel is more encumbered with shoals, and is unbuoyed. *See view b on page 142.*

Islands and dangers.—A patch of 3 fathoms, at the north end of a shoal, about a mile in length, with depths under 5 fathoms, lies 120° true, distant 8 cables, from Tanjong Rambut, north side of the entrance.

- A patch** of 3 fathoms lies 76° true, distant $3\frac{1}{2}$ miles, from the same point. Depths of 4 to 5 fathoms extend $1\frac{1}{2}$ miles south-east of it, and there are patches of $4\frac{1}{4}$ to 5 fathoms for 3 miles beyond, eastward of the Pandan islands, for which *see the chart.*

- Northward of the 3-fathoms patch is a bank with a least depth of 4 feet; both are situated on the bank with depths under 5 fathoms extending southward from Little Karimun, as charted.

Buoys.—Westward of Tanjong Rambut, at about 2 cables off Tanjong Babai, is a rock with less than 6 feet water, marked by a white conical buoy.

- Pulo Merak, 230 feet high, is situated near the centre of a bank with depths of 4 feet to 2 fathoms, fronting the south side of Great Karimun.

A white conical buoy marks the north side of the strait at one mile south-east of Merak and 4 cables south-west of its west extreme.

General charts 1355, 3543.

Chart 2403, Singapore strait. Var. nil.

A black can buoy marks the north side of the bank, with depths under one fathom, extending about a mile north-eastward of Pulo Babi. A bank with depths under 3 fathoms extends from 2 to 3 miles north-west of Pulo Babi. 5

Pulo Babi, 262 feet high, divides the strait, as before mentioned; southward of it are Songkop and other islets. Charcoal burners live on the island.

The southern side of Gelam strait, from its eastern entrance as far west as Songkop, is free from danger, but patches of $1\frac{3}{4}$ and $2\frac{1}{2}$ fathoms lie northward of that islet in the southern channel of the strait. 10

Tidal streams.—The flood stream runs for 4 hours in an easterly direction, and the ebb for 8 hours in a westerly direction; the time of the turn of the stream is not furnished. See page 143.

Directions.—These directions, from the eastward, are written from the charts, and they are not on a large enough scale to be of service when westward of Pulo Babi. 15

The summit of Pulo Babi seen through the entrance, bearing 261° true, leads through the fairway of the strait in about 5 fathoms water; from abreast the eastern white buoy off Merak bank, steer between it and the black buoy, thence southward of the western white buoy, and, following the northern shore for some distance, pass round the north-west extreme of Pulo Babi bank, thence on either side of Pulo Temblas, and thence southward, passing westward of the black buoy on the rock north-east of Belembang for the desired inshore passage leading to the westward. 20 25

Anchorage.—There is a fair anchorage in a depth of 9 fathoms muddy bottom, off Tanjong Balai village, near the buoy, but with no shelter from the violent westerly and south-westerly squalls that occur from April to November. 30

KARÍMUN and Kundur islands.—General remarks.—These islands are a part of the Rhio province and its dependencies, and consist of about 10 large and about 30 smaller islands, most of which are uninhabited. These are very different from the low marshy islands of the east coast of Sumatra described in the preceding pages; they are hilly, mostly of granite formation, and have a clay or sandy soil of great fertility. There are reefs and shoals nearly all round, most of which are wholly or partly dry at low water. There are no streams of any importance, but in the level portions of Great Karímun there are rivulets useful to native boats for transporting native products, principally gambier and pepper, to the coast. The Sungi Alur Terap, flowing to the east coast of Great Karímun, forms a picturesque waterfall on the slope of Gunong Betina, much 35 40

General charts 1855, 3543.

Chart 2403, Singapore strait. Var. nil.

visited by tourists. Most of the high timber has been cut down; there are smaller trees on the marshy portions of the coast.

Population.—The population of this group of islands is divided into two classes, the Chinese and the native. There are about 4,000 Chinese men and 300 women, and 4,000 natives and 3,500 women; the natives are chiefly Malays with a few Buginese, and still fewer Orang Tambus. These latter live in wretched huts on the west side of Kundur, on the north and south coasts of Papan, and on the south coast of Great Karimun.

Trade.—The interior of the larger islands is owned entirely by Chinese, who are engaged in the cultivation of the land, who ship their produce to the coast by canoes or trading boats, whence it is shipped to Singapore. It consists of gambier, pepper, charcoal, sago, tin, &c.

Climate.—The climate, except in the swamps, is not unhealthy; the temperature is lowered by the heavy rains which are the cause of the fertility of the soil; February is the coolest month, but even then there are showers.

GREAT KARIMUN ISLAND is 10 miles in length in a north-west and south-east direction; near its north end are two peaks, Jantan, 1,491 feet, and Betina, one mile further north, 1,368 feet high; the remainder of the island is principally low barren land. Its southern end is separated from Pulo Parit and Tulang, situated close to Papan, by Gelam strait, $1\frac{1}{2}$ miles wide. *See* views, abreast.

A number of islets, rocks, and reefs lie between the coast and the 5-fathoms contour line, especially on the south-west, west, and north-west sides; there are also outlying islands and islets, the principal being Little Karimun off the north-east point, Assan and Mudu on the north-west, and Temblas, Merak, and Babi on the south-west.

On the east side, the bay to the northward of Tanjong Sebatak is filled by a shallow mudbank extending one mile from the shore, out to the line of its entrance points.

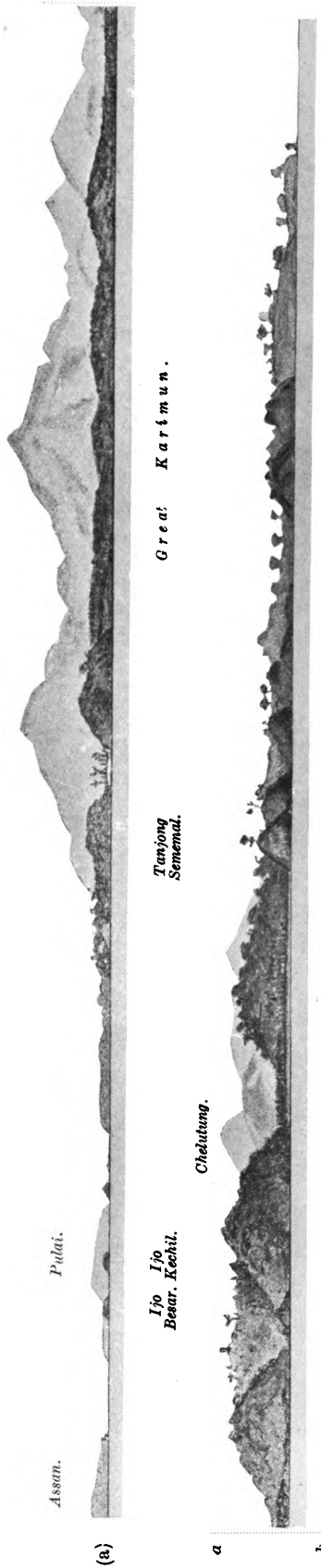
The coast between Tanjong Balai and Tanjong Rambut and to the northward therefrom is of a remarkable red colour.

Settlements.—The principal villages on the coast of Great Karimun island are Tanjong Balai and Pernal, both on the south coast. On the north-east point of the island is a rubber factory and a short pier with a depth of 4 fathoms. The electric lights on the factory are seen from Malacca strait.

At Tanjong Balai (*Lat.* $0^{\circ} 59' N.$, *Long.* $103^{\circ} 26' E.$), the District Governor resides. There is a Chinese headman under him, who is responsible for the Chinese throughout the island. There is a landing stage in front of the Governor's house.

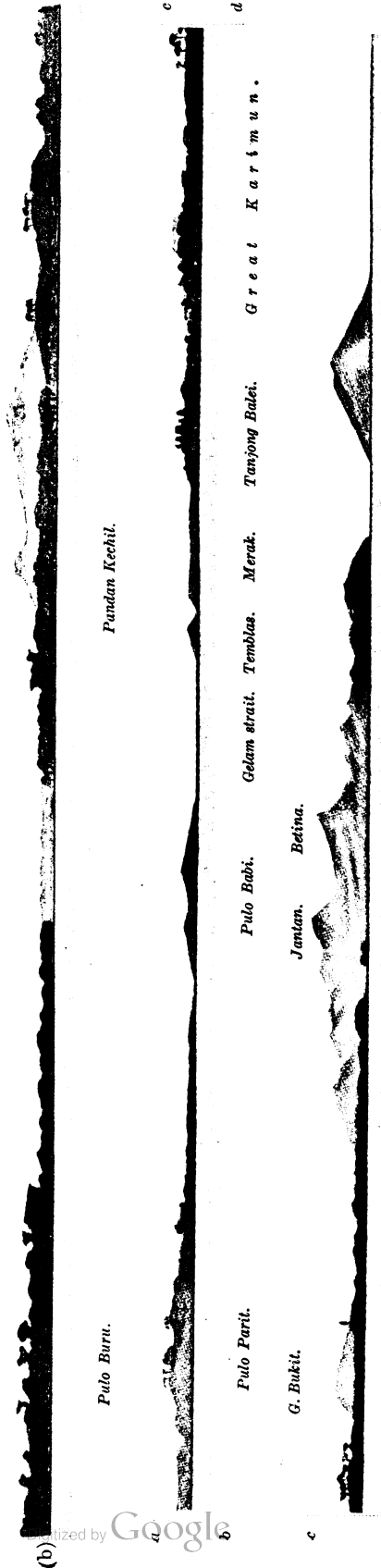
General charts 1355, 3543.

View from about 2 miles westward of the centre of Great Karimun.
Assan. *Pulau.* *Belina.* *Jantan.*



Approach to Sungi Kampur, westward of Karimun islands (from Lat. $1^{\circ} 34' N$, Long. $103^{\circ} 16\frac{1}{2}' E$).

Eastern approach to Gelam strait.



Karimun islands and East entrance to Gelam strait distant 5 miles. (From Lat. $1^{\circ} 40' 50'' N$, Long. $103^{\circ} 16' E$).

Chart 2403, Singapore strait. Var. nil.

Communication.—Small steam craft communicate with Singapore every alternate day.

Jetty.—There is a jetty at Tanjong Balai village, in Gelam strait, about 115 feet long with a depth of 4 fathoms alongside; rocks drying at low water extend about 2 cables from the shore westward of the pier. 5

Tides.—It is high water, 2 days after full and change, at Balai, at XIh., with a spring rise of 8 feet; neaps rise $2\frac{1}{2}$ feet. The spring rise becomes 9 feet, and neaps $1\frac{1}{2}$ feet in the latter half of March; in the second half of June and December the spring rise is 7 feet and the neaps rise $3\frac{1}{2}$ feet. Single daily high water occurs: 1st January, IXh. a.m.; 1st April, IIIh. a.m.; 1st July, IXh. p.m.; 1st October, IIIh. p.m. Springs occur $1\frac{1}{2}$ days after the moon's greatest declination with a rise of 3 feet; neaps rise $1\frac{1}{2}$ feet. 10 15

Anchorage.—There is a good anchorage during the south-west monsoon, off the eastern side of Great Karimun, to the south-eastward of Little Karimun; the bottom is of stiff grey mud, and excellent holding ground. The depths over the bank fronting it are from $4\frac{1}{2}$ to 5 fathoms, and has to be crossed to get near the shore; outside it the depths are from 5 to 12 fathoms. 20

Tidal streams.—At this anchorage the south-east stream makes 2 hours after high water at Singapore. In the channel between the Karimun islands the streams run at the rate of 4 knots at times, and probably run for the same number of hours as the eastern stream in Gelam strait. 25

Little Karimun (*Lat. $1^{\circ} 9' N.$, Long. $103^{\circ} 23' E.$*), separated from the north-east end of Great Karimun island by a deep channel half a mile wide, is a high bold island, $2\frac{1}{2}$ miles in length, rising to a height of 1,240 feet, without any remarkable peak; only the south-west side is inhabited. 30

From the north-west side a bank extends inside the 5-fathoms contour line for a distance of nearly $1\frac{3}{4}$ miles to the westward, with a least depth of $3\frac{1}{2}$ fathoms. Its extreme lies eastward of Tuntun or White rock, which is fairly steep-to. 35

Pulo Nangoi, or the South Brother, 128 feet high, lies $1\frac{1}{10}$ miles westward of the north-west point of Little Karimun.

On the south side a bank, with depths under one fathom, extends in a south-south-east direction for about a mile, and beyond this it continues, in the same direction, parallel to the coast of Great Karimun for a further distance of about 10 miles, with depths varying from $3\frac{3}{4}$ to 40

General charts 1355, 3543.

Chart 2403, Singapore strait. Var. nil.

5 fathoms; but near its southern end is a narrow ridge nearly $1\frac{1}{2}$ miles in length, having a least depth of only $1\frac{1}{4}$ fathoms, mentioned with Gelam strait approach.

- 5 Button islet, about 30 feet high, is small, and lies in the fairway of the south entrance to the channel between Great and Little Karimun. There is a similar islet near Little Karimun, at 8 cables further northward.

- 10 **The Brothers**, with the light on Pulo Kechil, are described with Tanjong Bulus, abreast them on the Malay peninsula, at the western entrance to Singapore strait, page 238.

General charts 1355, 3543.

CHAPTER IV.

MALACCA STRAIT AND ITS NORTHERN APPROACH (*cont.*)—MALAY OR EASTERN SHORE, FROM SALANG OR JUNKSEYLON ISLAND TO PENANG.

VARIATION, 1915, decreasing about 4' annually.

GENERAL REMARKS.—This chapter treats of the eastern shore of Malacca strait from Salang or Junkseylon island to Pulo Penang, about half-way down the strait.

Chart 842, Sayer island to Langkawi island. Var. nil.

SALANG or JUNKSEYLON (Puket) ISLAND 5
(*Lat. 8° S., Long. 98½° E.*), occupied by the Siamese of Ligor, and separated from the Malay peninsula by Papra or Pak-Phra strait, is about 24 miles in length, 10 miles in breadth, and divided into two Rajaships of about equal size, the northern being named Salang, and the southern Puket. The population of the island, composed of 10 Malays, Chinese, and Siamese, is about 33,000. The principal towns are Puket or Tongka, Bandon, Kathu, and Tharúa, the old capital. The north shore of Papra strait is under the Raja of Takuatung.

Salang island is rich in tin mines, which appear to have been worked for centuries back. *See Puket, page 8.* 15

West coast.—The west coast of Salang island trends nearly north and south, and has several large bays, with deep water, but none affording any protection during the south-west monsoon. The northern part of this coast is low and has wooded hills of moderate height immediately within it, with the exception of a small portion 20 at 8 miles from the north point of the island. The southern part is a range of mountains from 1,000 to 1,750 feet high, thickly wooded, and sloping gradually to the northward and southward, and the whole of this side of the island is steep-to, with depths of from 10 to 12 fathoms close to the shore. Goh Gavai, two small islands, one of 25 which is 50 feet high, the other low, lie close together one mile south-westward from Lem Son, which is 8 miles southward of the north-western point of Salang island, and have deep water around them.

Bandon river (*Lat. 8° 2' N., Long. 98° 16' E.*) enters the sea just south of Lem Son; on it is the town of Bandon, the population of 30 which is estimated at about 9,000.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. nil.

PAPRA or PAK PHRA STRAIT (*Lat. 8° 11' N., Long. 98° 17' E.*), about half a mile in width, separates Salang island from the Malay peninsula, is about 14 miles in length and much used
 5 by junks. The natives are very superstitious about this strait, its name signifying Lord's mouth. The land on both sides is mostly low and wooded, but the capes or lems are high, and within the north shore are hills of moderate elevation. A conical hill, about 200 feet high, lies just within Lem Pak Phra.

10 The narrowest part of Papra strait is between Lem Hin on the mainland and Lem Khun on Salang island, eastward of which latter there is a sandbank dry at low water; southward of this bank the depth is $1\frac{1}{2}$ fathoms at low water, whilst there are 4 and 5 fathoms to be found on the northern, western, and eastern sides of it. Another
 15 large sandbank extends from the west side of Lem Asam, on the mainland $2\frac{1}{2}$ miles south-eastward of Lem Hin, the channel lying between it and the bank already described.

Goh Galah, a white rocky islet, is situated $1\frac{1}{2}$ miles south-eastward of Lem Khun, and Goh Janak is an islet lying a quarter of a mile
 20 south-westward of Goh Galah. South-westward of Goh Janak there are extensive sandbanks dry at low water, and to the southward is Tamaprau river, with the town of the same name on the banks 2 miles from its mouth. Muang Mai, a larger town, is situated $1\frac{1}{2}$ miles further southward, but boats cannot go beyond Tamaprau.

25 **Bar.**—The depth on the bar, at the western entrance of the strait, is subject to great changes, varying from one fathom to 3 fathoms at low water, and the channel is tortuous and difficult even for boats; the passage of the strait should not be attempted without the assistance of a pilot. Off the northern point of the entrance, a reef of
 30 rocks, only visible at low water, extends a short distance, and shallow and shifting sandbanks front both points.

In the south-west monsoon the sea breaks entirely across the western entrance, but in the north-east monsoon it is generally smooth.

35 **Supplies.**—Along both shores of the strait are several villages where provisions and water may be obtained.

Anchorage.—Inside the bar there is good anchorage in 5 or 6 fathoms water; and from thence to Lem Khun there is a good
 40 channel for small craft with depths of from 4 to 6 fathoms at low water.

To the eastward of Goh Janak and Goh Galah there is good anchorage in from 4 to 5 fathoms water.

Directions.—These directions are old, and not easily followed on the chart; a pilot should be employed by small craft wishing to pass

Chart 842, Sayer island to Langkawi island. Var. nil.

through it from seaward. Having passed through the entrance and up the strait to Lem Khun, steer to pass 2 cables north-eastward of Goh Galah, and then at $1\frac{1}{2}$ cables off Lem Sai; in this part there are depths of 4 and 5 fathoms. Then steer to pass about 2 cables northward of Goh Rangam, a round island, like all the rest in this locality, covered with trees; between these two places the channel, which is formed between the fringing sandbanks, is little more than one cable wide, with a depth of 2 fathoms at low water, spring tides, over a soft mud bottom. 5

From Goh Rangam Jai steer to pass about 3 or 4 cables southward of Goh Rangam Noi, the water gradually deepening as the latter is approached; pass Sam Lem, the north-east point of Salang island, at 3 or 4 cables distant, in 5 to 7 fathoms water. Thence, pass 5 cables southward of Goh Leng and 3 cables northward of Goh Thanan or Pulo Chupo, a small round island one mile eastward of Sam Lem. Pass one mile eastward of Goh Thanan and then, if bound to Tharúa harbour, on the eastern side of Salang, steer between Goh Ret and Goh Naka Joi in about 6 fathoms water. 10 15

Tides.—The tides in Papra strait are very irregular. At the bar the times of high and low water seem to correspond nearly with those at Puket, page 149; in the middle of the strait the tide rises from 6 to 8 feet. 20

Tidal streams.—In the strait, the streams during the flood set in from both ends and meet at the sandbank off Lem Khun; and the ebb stream runs out of both entrances to the strait. In the middle of the strait there is hardly any tidal stream, but at the western entrance the streams sometimes attain the rate of 6 knots, while at the eastern entrance they have generally about half that velocity. 25

South coast.—Lem Voalan (*Lat. $7^{\circ} 46' N.$, Long. $98^{\circ} 19' E.$*) is the south-west extreme of Salang island. At nearly three-quarters of a mile southward of this point lies Goh Keo Jai or Pagoda islet, on the north-west point of which there are two white pagodas, and between this islet and Lem Voalan there is a safe passage having from 8 to 10 fathoms water. 30

Southward of Goh Keo Jai is Goh Keo Noi, another islet, smaller than the former, but of about the same height and covered with trees. Besides these two islets there are five others along the south coast of Salang island, all high and wooded, with depths of from 5 to 10 fathoms around them, except along the north side of Goh Khalom. Goh Hi, with a rock off its west end, and Goh Bon lies southward of Goh Khalom, as charted. 35 40

A patch, with a depth of 5 fathoms, over which there is occasionally a slight overfall, lies about a quarter of a mile southward of

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. nil.

Goh Aú, the islet eastward of Keo Jai; in this vicinity there may be less water.

A rock, on which the depth is $1\frac{1}{2}$ fathoms, is situated about $1\frac{1}{2}$ cables off the east extreme of Goh Keo Jai.

Khelong bay, about 2 miles wide, lies westward of Lem Phan Va, the south-east extreme of Salang island, and is protected by Goh Khalom, on either side of which there is an entrance for small craft.

The Reusong and Mudong streams discharge in the northern part of the bay, and lead to large villages.

Supplies.—Fresh provisions and water may be obtained in abundance, and at reasonable rates, at the villages.

Anchorage.—The best anchorage during the south-west monsoon for other than light craft, is outside the bay, in 5 fathoms, at about 3 cables northward of Goh Aú.

Tidal streams.—In the channels between the several islets the flood stream sets to the eastward, and the ebb to the westward, at rates of from one knot to 3 knots an hour.

Plan of Puket or Tongka harbour, 843. Var. $0\frac{1}{2}^{\circ}$ E.

East coast.—Lem Phan Va (*Lat. $7^{\circ} 48'$ N., Long. $93^{\circ} 25'$ E.*), the south-eastern point of Salang island, is steep on its eastern side, but a reef, with rocks on it awash at high water, extends nearly a mile south-westward of the point. From Lem Phan Va, the east coast of Salang island trends to the northward, is fronted with numerous islands, and has two harbours, namely, Puket or Tongka, and Tharúa.

Tidal streams.—In the channel between this coast and Goh Jao Jai, leading to Papra strait, and Kasom at the head of the bay, the flood stream sets to the northward and the ebb stream to the southward, at rates of from 2 to 3 knots an hour.

PUKET or TONGKA HARBOUR.—Goh Tapaunoi, or Pulo Kapal Kechil, nearly half a mile in length in a north and south direction, a quarter of a mile in breadth and 250 feet high, lies 2 miles north-north-eastward of Lem Phan Va, and forms the east side of the entrance of Puket harbour. Goh Tapau Jai or Pulo Kapal Besar, $6\frac{1}{2}$ cables long in an east and west direction, a quarter of a mile broad, and 395 feet high, lies between it and the shore, at 3 cables westward of the south point of Goh Tapaunoi; a rocky shoal, with an islet and sandbanks, extends one mile southward of it. The deepest entrance to Puket harbour is between these islands. A basin with deep water approach is being constructed in the harbour.

Pulo Sirih, an island separated from the east coast of Salang by a narrow creek, which at low water is impassable even for boats, forms

General charts 842, 830, 70.

Plan of Puket or Tongka harbour, 843. Var. $0\frac{1}{2}^{\circ}$ E.

the north-east extreme of Puket harbour; its south-east point is named Lem Atpha.

LIGHT (*Lat. $7^{\circ} 50' N.$, Long. $98^{\circ} 25' E.$*).—A light is shown from a white cylindrical tower, 48 feet in height, erected on Goh Tapaunoi. 5

The keeper's dwelling is painted white with a red roof. See Light list.

Signal stations.—There is a signal station on Goh Tapaunoi; also at the Harbour master's office up the creek, and on the hill over Tongka. 10

Shoal.—A shoal, with a depth of $2\frac{1}{2}$ fathoms, lies within the island, nearly in the fairway of approach to the anchorage, with the east extreme of Goh Tapau jai bearing 163° true, distant $3\frac{1}{2}$ cables.

Anchorage.—The harbour is divided into two anchorages by a sandy flat, over which there are depths of from one to $1\frac{1}{2}$ fathoms at low water, spring tides; only small vessels go into the inner harbour, in which there is anchorage in a depth of about $2\frac{1}{4}$ fathoms; there is said to be more water than is shown on the plan. 15

Vessels of moderate draught anchor in from 4 to 5 fathoms water, northward of the $2\frac{1}{2}$ -fathoms shoal, and about half a mile northward of the east extreme of Goh Tapau jai. 20

The bottom, at both inner and outer anchorages, is mud. The harbour is open to easterly and south-easterly winds, during the prevalence of which there is a little swell.

Directions.—From off Lem Phan Va proceed north-eastward until Tongka hill is seen midway between Tapaunoi and Tapau jai islands, bearing 340° true, when steer for it, passing between the islands in a depth of 4 fathoms; and guarding against being set on the bank extending eastward of Goh Tapau jai; then pass eastward of the $2\frac{1}{2}$ fathoms shoal and anchor as convenient in the outer harbour. 25 30

To proceed to the inner harbour bring the eastern extreme of Goh Tapau jai to bear 170° true, and keeping it astern on this bearing, anchor when Lem Atpha bears 74° true.

Light draught vessels may enter the harbour by passing 3 cables northward of Goh Tapaunoi, and thence as before directed. 35

Fishing stakes extend, in places, from the shores, and will also be found on some of the off-lying shoals.

Tides.—It is high water, full and change, in Puket harbour, at Xh. 10m., springs rise 9 feet, neaps 7 feet; during the south-west monsoon the day tides are higher than the night tides. In the north- 40

General charts 842, 830, 70.

Plan of Puket or Tongka harbour, 843. Var. $0\frac{1}{2}^{\circ}$ E.

east monsoon the night tides and the day tides are equal. Very little tidal stream is felt in the harbour.

Towns.—Puket or Tongka (*Lat. $7^{\circ} 54'$ N., Long. $98^{\circ} 23'$ E.*), the principal place in Salang island, lies about one mile up a creek, is the residence of the Raja, and the only port frequented by coasting steam vessels; at high water small craft can ascend to the town, but at low water the creek is nearly dry in places; the channel is marked by stakes.

The buildings are mostly wooden houses with thatched roofs, but include a few of brick; the Government house, the residence of the Siamese Royal Commissioner, the stamp office for tin, the barracks and Commandant's house, and several tin-smelting houses; there is a road from the Harbour master's office and pier to the town. The Commandant has a force of Sikh police to maintain order amongst the Chinese miners; tin is exported from the mines and from dredgings in the waters of the bay.

Six miles west of Tongka, and joined by an indifferent road, is the town of Kathu, containing about 8,000 inhabitants, principally Chinese miners.

Population.—The population of Puket or Tongka is estimated to number about 10,000.

Communication.—*See* Puket, page 8.

Trade.—In 1911 the value of imports was £462,651, and that of exports £776,147. The port was entered by 708 vessels, having a total tonnage of 79,248 tons. The tin and tin-ore exported in 1912-13 amounted to 3,548 tons.

Supplies.—Fresh beef is difficult to procure, poultry and vegetables are plentiful, and can be obtained at reasonable prices. Water not very good, is brought alongside when required, and good water can be procured from two wells, one on Goh Tapau jai, the other on the northern side of Nambo point, the point north-westward of that island. Coal cannot be procured, but firewood can be purchased.

Chart 842, Sayer island to Langkawi island.

THARÚA HARBOUR.—Goh Maprau lies about a mile northward of Pulo Sirih, and Tharúa harbour is situated in the bay between it and Lem Jam. The town of Tharúa, situated $1\frac{1}{2}$ miles up a small river of the same name, was formerly the residence of the Raja of Puket, since removed to Tongka. At one time it was a town of considerable importance, a large Portuguese settlement, and the harbour was frequented by numbers of European vessels; it has now, however, no trade. The ruins of a fine market street, composed of

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

brick buildings, and the spacious houses belonging to the Europeans who once resided here, still exist.

The entrance to the harbour is northward of Alang Noi, an islet northward of Alang Jai.

Directions.—Approaching the bay, steer to pass about half a mile eastward and northward of Alang Noi, in depths of about 8 fathoms, after which the water shoals gradually westward to the anchorage, where there is a depth of 3 fathoms, over mud bottom, with the north extreme of Alang Jai bearing about 110° true and the middle of Goh Maprau 185° true. There appears to be a shoal about half a mile westward of Alang Jai; and vessels should not attempt to pass between Goh Maprau and that island, as the channel is foul.

Klang Bangkrong, 2 miles northward of Lem Jam, is a creek leading to the old residence of the Raja of Salang.

ISLANDS.—**Goh Jao Jai or Pulo Panjang** is a large island, 7 miles eastward of Salang island, belonging to the Raja of Panga.

The west coast of the island, which trends in a northerly direction, is of moderate height, and has in the middle a large bay named Au Lubo, in which there are depths of from 2 to 3 fathoms. In this bay are two villages, and on the southern side of the entrance lies an islet with a group of rocks north-westward of it. Some of which are above water; the northern part of the bay is clear of rocks. Close to the shore of the bay there are depths of from 4 to 6 fathoms. Lem Nia, the north-west point of Goh Jao Jai, is a high bluff, steep-to.

Au Lubaling (*Lat. $7^{\circ} 55' N.$, Long. $98^{\circ} 35' E.$*), a shallow bay, indents the south coast, and Klang Lubaloi, a stream, flows into its northern part; one mile up the river is a village of the same name.

Goh Musang forms, at low water, the south-west point of the bay, and is connected with the main island by sandbanks and rocks, over which there is a depth of about 3 feet at high water. About 2 or 3 cables south-east from this island are some rocks about 30 feet high, and there is broken ground about one mile off, with depths of from 3 to 6 fathoms, but outside the depths are from 10 to 16 fathoms.

Lem Hualan, the south-east point of Goh Jao Jai, is a high, bold point, with deep water close to the shore.

From Lem Hualan the east coast of Goh Jao Jai is high and bold, with deep water close to the shore, and has a northerly direction as far as Goh Rang Nok, thence north-north-westward it is low and sandy as far as Lem Sam, its north-east point. About 3 miles north-eastward from Lem Hualan is a group of rocks, of which at high water only one small point is visible about 2 feet; between the rocks and the main island are depths of 8 and 9 fathoms.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

The north coast of Goh Jao Jai takes a west-north-west direction, and is mostly low and sandy; the water along this coast is shallow, the north-west point excepted, where there is a depth of 5 to 6 fathoms close to the shore. The hills of Goh Jao Jai form one long range, from 500 to 1,000 feet high, extending from the north-west to the south-east point of the island.

Goh Gai or East Bungo (*Lat. $7^{\circ} 46'$ N., Long. $98^{\circ} 37'$ E.*), $8\frac{1}{4}$ miles southward of Lem Hualan, is a round islet 100 feet high, covered with trees, and with deep water around it; at about 3 miles northward from Goh Gai is a pointed rock, about 5 feet high, also surrounded by deep water.

Goh Dakmai or West Bungo, a high, square islet, with almost perpendicular sides, lies about 6 miles north-westward of Goh Gai, and has deep water around it. There is a safe channel for vessels coming from the south-eastward and bound to Puket harbour, to the southward of Goh Gai, and then in between Goh Mai Tan and Goh Dakmai.

Goh Mai Tan or Pulo Bambu, a narrow island, $1\frac{1}{2}$ miles in length, of moderate height, and covered with trees, lies about 4 miles south-westward of Goh Dakmai; at one cable off its south point there is a group of rocks, some above water, with deep water close to them, but within half a mile all round this island are depths of from 10 to 15 fathoms. The north-east coast forms a sandy bight, which affords some shelter in the south-west monsoon, in depths of 6 and 7 fathoms. The north point is low and sandy, with a rock, always visible, off its extreme.

Goh Khai Nok, a low, sandy islet, lying in the channel between Goh Jao Jai and Salang island, and about 5 miles east-north-eastward of Lem Atpha, has a bluff on its south side, covered with trees; it is surrounded by rocks extending to a distance of about three-quarters of a mile, of which two patches are visible, the one north-westward, the other south-eastward of the island.

Goh Khai Noi is smaller and lower than Goh Khai Nok, from which it is separated by a channel $2\frac{1}{4}$ miles in breadth, with depths of 10 and 12 fathoms. This islet is surrounded by rocks, which do not, however, extend for any distance.

Goh Sob (*Lat. $8^{\circ} 2'$ N., Long. $98^{\circ} 31\frac{1}{2}'$ E.*) are two small, high, perpendicular rocks, about $3\frac{1}{2}$ miles northward from Goh Lipe (a conical rock more than 100 feet high), and about one mile off the coast of Goh Jao Jai; there is deep water all round them.

About 4 miles to the westward of Goh Sob are three other islands, Goh Naka Noi, Goh Naka Joi, and Goh Peh; patches of rocks extend

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

for $1\frac{1}{2}$ miles north-westward of Naka Noi, and the south point of Naka Joi is foul. Between these last three islands and Salang island there is a good channel with depths of from 4 to 5 fathoms.

GOH JAO NOI, about 500 feet high, and thickly wooded, lies to the northward of Goh Jao Jai, from which it is separated by a channel from a quarter of a mile to $1\frac{1}{4}$ miles in breadth. In the western part of the channel are depths of from 3 to 5 fathoms along the Goh Jao Jai side; towards the middle of the channel the water shoals to $1\frac{1}{2}$ fathoms, and in the eastern part it deepens again to 4 and 5 fathoms.

About half a mile north-westward of Lem Sam (*Lat. $8^{\circ} 5' N.$, Long. $98^{\circ} 36' E.$*), the north-east point of Goh Jao Jai, is a rock about 10 feet high, to the southward of which are depths of 5 to 6 fathoms. Lem Sam is a very low sandy point, with a bank extending from it in a north-easterly direction. The eastern approach to Lem Sam has depths of 2 to 3 fathoms.

From Lem Sai, the south-east point of Goh Jao Noi, the east coast trends in a northerly direction for 8 miles. At about 3 cables distance off Lem Sai, two islets, named Goh Deng, are surrounded by sandbanks and connected with the main island by a reef. To the northward of these islets the coast is perfectly clear, with depths of 5 and 6 fathoms close to the shore, and from 9 to 10 fathoms about one mile off.

At about 3 miles eastward of Lem Sai is an extensive group of islands, all high and bold, and almost without exception steep-to, the southern of the group is named Goh Ganam (*Lat. $8^{\circ} 3' N.$, Long. $98^{\circ} 40' E.$*). Between these islands and Goh Jao Jai is a channel with depths of 10 and 12 fathoms.

Tidal streams.—The flood stream in this channel sets to the northward, the ebb to the southward, at the rate of about 2 or 3 knots an hour.

Lem Dakmai, the north point of Goh Jao Noi, has several islets off it, but immediately to the northward are Goh Doda, two high, perpendicular islets, which can be passed on either side, but the channel north of them, in which the depth is 7 fathoms, being the broader, is generally used. About one mile east from Goh Doda are two high, perpendicular rocks named Goh Thalu; between Lem Dakmai and Goh Doda there is a depth of 7 fathoms.

Goh Broi and Goh Batang are two high, bold islets north-west of Lem Dakmai; Goh Broi has deep water on its north and east sides, Batang on its south and east sides; on the other sides of both are extensive sandbanks with shallow water. Northward of Goh Doda lies a group of islets, the principal of which are Klui and Chung Lat. Goh Bantae and Chung Lat are small, rocky islands.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Westward of this group is a good channel with from 7 to 10 fathoms water, leading between Goh Ganam and Goh Klui; this channel trends in a north-north-west direction, and is the usual passage up to Panga.

5 Goh Klui and the island near it are high with steep sides.

The South coast of Goh Jao Noi trends in a westerly direction, is mostly low and wooded, and there are large sand and mudbanks extending along the whole length of it.

The west point of Goh Jao Noi is connected by a reef with an islet, 10 Goh Jung, to the north-westward of which is a high island, Goh Boi Jai, with deep water on its west side; between this island and Goh Jung there is a depth of $1\frac{1}{2}$ fathoms, and the bottom is rocky. Patches of $1\frac{1}{2}$ fathoms encumber the channel westward of Goh Jung.

Goh Plong, about one mile northward from the west point of Jao 15 Noi, is surrounded by rocks and sandbanks.

Goh Boi Nai, two rocks above water, about half a mile northward of Goh Boi Jai, are surrounded by shallow water.

Goh Bantan, a larger island, about one mile northward of Goh Boi Jai, is about 200 feet high, and has deep water on its west and north 20 sides.

Head of the bay.—In the bay to the northward of Goh Jao Noi, besides many small there are three tolerably large streams, the Kasom or Takuatung, the Panga, and the Paklan.

KASOM or TAKUATUNG RIVER (*Lat. $8^{\circ} 18'$ N., 25 Long. $98^{\circ} 29'$ E.*) lies at the head of the bay, within and north-eastward of Salang island. The town of Kasom, the residence of the Raja of Takuatung, is situated 4 miles above the mouth of the river; a large quantity of tin is exported from Kasom. At the mouth of the river is Goh Panji, a high, bold islet, abreast which there are depths 30 of from 2 to 3 fathoms in the channel between the sandbanks, whence for a short distance up are depths of 3 to 4 fathoms; the depth to the town is not stated, but a pilot is necessary.

Anchorage may be obtained in depths of from 3 to 4 fathoms, at about 2 miles off the mouth of the river.

35 **Directions.**—The Kasom river is approached from the southward to within 2 miles of its mouth, by passing between several islands; on the eastern side are Goh Boi Jai and Bantan, and on the western side an extensive group of high, bold islands, from 500 to 1,000 feet in height, lying along the coast of the mainland. Goh Chanak, the 40 largest of these islands, about $2\frac{1}{4}$ miles westward of Bantan, is about 2 miles in length and 500 feet high. The space between this group of islands and the mainland is encumbered with rocks and sandbanks, some of which are visible at low water.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Vessels bound to Kasom should, after passing Pulo Sirih, on the east coast of Salang island, at about one mile distant, keep in about mid-channel, along Alang Jai and Goh Lipe, thence between Naka Noi and Goh Sob, thence between Goh Chanak and Bantan, where there is a depth of 10 fathoms; from here a 0° true course leads up to the entrance to the river, the water shoaling gradually. Both outside and in the mouth of the river are large sandbanks, between which a channel, with depths of from 2 to 3 fathoms, takes a north-north-east direction as far as, and close to, two islets, Goh Nam Sao, the only ones on the star-board side entering; from this the channel trends north-north-westward, and is narrow.

KLONG PANGA approach.—**Goh Mak** (*Lat. $8^{\circ} 16' N.$, Long. $98^{\circ} 34' E.$*), a low, wooded island, about $1\frac{1}{2}$ miles in length and three-quarters of a mile in breadth, lying in the approach to Panga river, is surrounded on the north, west, and south sides by extensive sandbanks, and also to some little distance on its eastern side.

A flat, composed of sandbanks and rocks, part of which are visible only at low water, extends about 4 miles southward and westward of Goh Mak; southward of this flat there is a channel, in which the depth is $1\frac{1}{2}$ fathoms at low water spring tides, leading into the channel to the Kasom, but it is not often used.

Anchorage.—There is anchorage off the eastern side of Goh Mak, in about 7 fathoms, with the north extreme of Goh Mak bearing 270° true. The water shoals rapidly from a depth of 6 fathoms.

Supplies.—The Raja of Panga has a house here. Poultry, vegetables, and fruit can be procured, and good water is plentiful; the best is to be obtained on the north-east side of the island, and at high water boats can go close up to the well.

KLONG PANGA (*Lat. $8^{\circ} 19' N.$, Long. $98^{\circ} 32' E.$*). — A wooded islet divides the mouth of the river into two channels; the eastern is the navigable one. There is a passage to the Kasom about $1\frac{1}{2}$ miles above the entrance, and a stream equal to the Panga enters it from the eastward at about half a mile above the passage to the Kasom. The shallow water in the Panga is usually marked by a tall, reedy grass growing on it, and is, therefore, easily avoided.

Steam craft of 6 feet draught can ascend the river for about 4 miles, to abreast a remarkable limestone cliff about 500 feet in height, but here the river is barred by a sandbank, and there is only about 2 feet at low water in places, up to Panga, some 8 miles above.

Panga town is situated about 12 miles up the Panga, or about 15 miles above Goh Mak anchorage; the valley and town are sur-

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

rounded by precipitous cliffs of about 1,000 feet in height; the valley is exceedingly fertile, and there is a considerable rainfall (May to December). The population is probably about 2,000, mostly Siamese,

5 with a few Malays and Chinamen.

Supplies are abundant.

KLONG PAKLAN (*Lat. $8^{\circ} 21' N.$, Long. $98^{\circ} 36' E.$*) lies 4 miles eastward of the Klong Panga, and in the north-east corner of the bay; in its approach from Goh Mak there is a good channel with
10 depths of from 3 to 5 fathoms.

Off the river there is a bar with a depth of 2 fathoms at low water in the fairway, but within there are depths of from 3 to 5 fathoms for a considerable distance. Paklan, the Raja of Paklan's residence, is situated 6 miles up the river.

15 **Directions.**—Vessels approach both the Paklan and Panga rivers eastward of the large island of Goh Jao Jai, and may anchor abreast Goh Mak, about 4 miles below their entrances.

If proceeding for the Paklan, from Goh Mak steer to pass eastward of a rock 20 feet high, lying $1\frac{1}{4}$ miles north-eastward of Goh Mak,
20 after passing which borrow on the mainland side to avoid the sandbanks extending southward from the westernmost of Goh Song Phi Nong, two high, bold islets, which lie about 2 miles southward of the mouth of the river. Pass between the islands and then steer straight for the river; a pilot is necessary for craft entering the river.

25 **COAST.**—**Lem Sak**, the south-east extreme of the peninsula, at about 5 miles northward of Goh Jao Noi, is high, bold land, but the point itself is low, sandy, and covered with trees. Reefs and sandbanks, partly visible at low water, extend about one mile from the point; between this point and Lem Deng is a large but shallow
30 bay. This coast has not been properly surveyed.

Lem Deng (*Lat. $8^{\circ} 14' N.$, Long. $98^{\circ} 41' E.$*) is a high, bold point 5 miles south-eastward of Lem Sak; eastward of it is a bay 4 miles in extent, with several high rocky islands. From Lem Deng the coast of the mainland takes a southerly direction for about
35 12 miles to Lem Hua Nak. In the middle of this coast is Lem Din Deng, a point from which rocks extend to some distance.

North-west of Lem Din Deng are groups of high, bold islets, between which and the mainland the depths are from one fathom to 2 fathoms. On these islets the natives collect edible birds' nests.
40 From Lem Din Deng towards Lem Hua Nak the coast is apparently clear, and the water deepens gradually from 3 fathoms at one mile southward of Lem Din Deng, to 10 fathoms off Lem Hua Nak.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Lem Hua Nak.—Islets.—Lem Hua Nak is a moderately low point covered with trees, with shallow water extending about half a cable off it. Two islets, the positions of which are doubtful, lie about one mile and 3 miles respectively south-westward of Lem Hua Nak. A rock just awash at high water lies about a cable northward of the inner islet. In the fairway, between this rock and the mainland, the depths are about 12 fathoms and apparently regular. 5

GHIRBI BAY lies between Lem Hua Nak and Goh Luang about 13 miles south-eastward of it. It is apparently shoal, but has not been surveyed. 10

Near the centre of the bay, southward of Lem Hua Nak, is a group of 13 small islands, the largest of which are Goh Damhok and Goh Damgoa, both high and bold.

NOTE.—Information is much wanted on the coast lying between Ghirbi bay and Perlis river; the chart and directions must be used with considerable caution, and those without local knowledge should give this portion a wide berth. 15

Bay of Seven Islands.—Eastward of Lem Hua Nak is a bay about 4 miles wide, backed by moderately high hills; there are seven islands in the bay, and its eastern side is formed by a succession of perpendicular limestone cliffs about 300 feet high. One of these, named Banana rock, about 300 feet high, and situated near the east point of the bay, resembles a banana, and is unmistakable; it may be seen from a considerable distance, together with the high extreme of the point southward of it. 20 25

Redpole bay (*Lat. $8^{\circ} 1' N.$, Long. $98^{\circ} 50' E.$*), eastward of Banana rock point, has a low wooded shore intersected by several streams, one of which is the Ghirbi river. The head of the bay dries to about one cable off shore, with depths of 2 fathoms a short distance beyond. 30

Anchorage.—H.M.S. *Redpole* anchored in a bight about half a mile across, on the western side of this bay, a few cables northward of Banana rock point. Here, in a position about midway between the entrance points and about half a mile off-shore, is a depth of $3\frac{1}{2}$ fathoms, with shelter from all but south-east and easterly winds. Partridge, quail, and snipe were plentiful. 35

Ghirbi river is the middle of the three rivers or streams in the north part of Ghirbi bay and leads up to a town of the same name, the residence of a Raja; coal in considerable quantities is found here, but is quite unsuitable for steaming purposes. The depth is about 3 fathoms in the approach at 2 miles south-west of its mouth. 40

Supplies.—There is a large export of poultry and vegetables from Ghirbi.

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Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Pakasi river, about 6 miles south-east of Ghirbi river, has depths of 4 or 5 fathoms in its mouth, but there are large sandbanks in the approach, with depths of 2 fathoms between them in a westerly direction from the river; but little is known of it.

Goh Luang (*Lat. $7^{\circ} 53' N.$, Long. $89^{\circ} 57' E.$*).—Lem Luang is the north-west point of a large island of the same name, forming the south-east extreme of Ghirbi bay; it is separated from the mainland by a broad but shallow strait, at the north entrance to which is an islet. Goh Luang is mostly low, but the cape is high and pointed.

Rocks.—Between Goh Luang and Goh Pipidon, 10 miles south-westward of it, there are said to be some rocks just covered at high water spring tides; the least depth charted is 2 fathoms, but the neighbourhood wants surveying.

Goh Ladujang, lying eastward and south-eastward of Goh Luang, is said to be separated from the latter and the mainland by a channel from one mile to 2 miles in breadth, with from one fathom to 3 fathoms water (the chart does not show it as an island). Goh Ladujang is mostly low land, covered with jungle, and with but few inhabitants.

Klat Dujang.—**Goh Tingsing** (*Lat. $7^{\circ} 46' N.$, Long. $99^{\circ} 4' E.$*), to the southward of Goh Ladujang, is separated from it by a channel nearly one mile in breadth, named Klat Dujang, with reported depths of 3 to 4 fathoms. Goh Tingsing is higher than Goh Ladujang and also densely wooded.

At the western entrance to Klat Dujang lies an extensive sandbank, partly dry, on the south side of which there is a passage leading seaward, with depths of from $1\frac{1}{2}$ to 2 fathoms at low water.

In the eastern entrance to this channel lies a group of islands, the largest of which is Goh Krapu, high and steep-to; it does not appear on the chart.

Klong Dujang entrance is about 15 miles southward of Klat Dujang, within Pulo Lantar; no information has been received respecting it.

PULO LANTAR consists of two large high islands to the southward of Goh Tingsing, and only separated from it by a narrow and shallow channel. The west sides of these islands extend in a line nearly north and south. From seaward they appear as one island, the narrow channel just mentioned not being visible, and the sandbanks, in the entrance of Klat Dujang, filling up the whole entrance of that channel.

Along the east sides of Pulo Lantar and Goh Tingsing are several small, high, and wooded islands. South-eastward of Goh Rekam, the

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

middle island of the group, about one mile distant, lies a rock which is always visible, resembling two square sails standing out of the water. Between these islands and the sandbanks, extending from the mainland, is a channel with depths shoaling gradually from 8 fathoms at the south point of Pulo Lantar, to 3 fathoms eastward of Klat Dujang. 5

South-eastward of Pulo Lantar lies a group of islands, one of the largest of which is Goh or Koh Muk. The north-western island of this group, about 4 miles from Koh Muk, is apparently about 3 miles in length; reefs extend a short distance from its north and south points. 10

Koh Muk is a square high island, with a low sandy shore on its eastern side. From the mainland opposite, large sandbanks extend, and between these and Koh Muk, close to the island, is a channel, having, in the shallowest part, $1\frac{1}{2}$ fathoms at low water, spring tides.

Anchorage.—With Koh Muk bearing, 270° true, distant one mile, small craft may anchor in a depth of 3 fathoms, over sand. 15

Koh Kadan, a long, narrow, and high island 3 miles south-westward of Koh Muk, is said to have deep water on its west side; its east side is foul, and from its south point reefs extend for several miles; some are awash at low water, but all are covered at half tide. 20

OFF-LYING ISLANDS.—PULO RAJA (*Lat. $7^{\circ} 36'$ N., Long. $98^{\circ} 22'$ E.*), situated about 10 miles southward of Salang island, attains a height of 1,064 feet in the south-western part, while the north-east side is low. See view B on chart 842.

Gulnare cove, at the north-west point, is about half a mile in length by a quarter of a mile in width, having a depth of 9 fathoms over sand, in the centre. There is a small inlet on the north side of Pulo Raja, where a stream empties itself during the rainy season. 25

Overfalls.—There are heavy overfalls on the southern side of the passage, nearly 5 miles wide, between Pulo Raja and the Brothers islands southward of it. 30

BROTHERS ISLANDS (*Lat. $7^{\circ} 30'$ N., Long. $98^{\circ} 20'$ E.*), situated about 15 miles southward of Salang island, are densely wooded, steep-to, and nearly connected by a reef. The northern island, 517 feet high, has a detached rock lying $3\frac{1}{2}$ cables off the north extreme. The southern island, 239 feet high, is of nearly uniform height; a reef extends about one cable from its south point. See view B on chart 842. 35

Current.—Southward of Salang island, during the north-east monsoon, the current sets north-west; during the south-west monsoon it sets south-eastward, but after strong westerly or west-north-westerly winds, the current, southward of the Brothers islands, sets eastward. 40

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Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

The VOGELS, a group of islands lying to the southward of Ghirbi bay, consists of one large island and five smaller ones. To the northward of Goh Pipidon, the largest island, are two smaller ones
5 named Goh Jung and Goh Mapai, the former high, the latter low.

Goh Pipidon (*Lat. $7^{\circ} 47'$ N., Long. $98^{\circ} 47'$ E.*), the largest of the Vogels, is a high wooded island, 4 miles in length in a north and south direction, by 2 miles in breadth, and apparently steep-to on the west side; the south and highest part forms a bight with depths of
10 6 to 7 fathoms close inshore. Extending about half a mile from the south-east point there is a dry reef surrounded by a sandbank; this reef is always visible.

A rock is reported as being situated $3\frac{1}{2}$ miles, 90° true, from the middle point of Goh Pipidon.

15 **Goh Pipithall**, high and bold, lies about a mile to the southward of Goh Pipidon, and in the channel between there are depths of from 8 to 10 fathoms; two high islets lie about a mile to the southward of Goh Pipithall.

Goh Ma, situated about 8 miles south-eastward of Goh Pipidon, is a
20 round islet, and between it and the islets southward of Goh Pipithall there are two large groups of rocks covered at high water.

A rock, awash at low water, is charted nearly 3 miles, 246° true, of Goh Ma; and there is a depth of 4 fathoms, the position of which is doubtful, charted midway between Goh Ma and Pulo Raja, 29 miles
25 westward of it.

PILGRIMS, a group of five islets lying $12\frac{1}{2}$ miles southward from Goh Ma, are all small, whitish-looking islets, bold and apparently steep-to, with reported depths of 20 to 24 fathoms within one mile; these depths are not borne out by the chart. They are not
30 visible at night as clearly as the other islands along this coast on account of their white colour. The largest of the Pilgrims is named Goh Ha-jai.

PULO MOHEA (*Lat. $7^{\circ} 13'$ N., Long. $99^{\circ} 4'$ E.*), a group consisting of two islands and an islet, lie close together, about 17 miles
35 south-eastward of the Pilgrims; the two large ones are wooded, 524 feet and 783 feet high, respectively, and have deep water around them. The eastern side of these islands is steep-to, and on this side of the southern island is a waterfall, the water falling almost from the top of the island into the sea; the south point of the southern island
40 is high, bold, and steep-to.

Anchorage.—On the west side, where the islands slope gradually, and abreast the north island apparently, is a sandy bight, with good anchorage, the water shoaling gradually to the shore; vessels may find good shelter here in the south-west monsoon.

45 **Sangald or Guilder rocks** are situated 14 miles westward from the south point of Pulo Mohea, and form a group, of which only

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Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

two small points are above high water. The south rock is about 8 feet, and the north rock about 4 feet high, and there are depths of from 30 to 35 fathoms around them. These rocks are dangerous, being hardly visible in the south-west monsoon, and there is often a strong tidal stream running past them. 5

General directions.—Steam vessels from the south-eastward, and bound for Puket harbour, should pass between Sangald rocks and Pulo Mohea, this being a clear channel, with depths of 25 to 30 fathoms. When about one mile off the south point of Pulo Mohea, shape a course for Goh Mai Tan, passing about 4 miles westward of the Pilgrims. In this part the flood stream sets north-westward, and the ebb south-eastward; in the offing the reverse is the case. 10

Vessels proceeding in the reverse direction may, from off the south point of Pulo Mohea, shape a course to pass eastward of the Butang group, and westward of Pulo Tenga. Thence course may be shaped for Pulo Lada, of the Langkawi group. 15

Small vessels, bound to Kedah and having local knowledge, pass between Pulo Terutau and Pulo Langkawi and the mainland, in depths of about 3 fathoms, but the coastline of the latter island is reported to extend considerably further north than charted; the shore of the mainland is skirted by a shallow mudbank to distances varying from 5 to 8 miles; abreast Pulo Langkawi, the passage is reduced to about 3 miles in breadth, and there are patches of 3 fathoms near the fairway. Southward of Pulo Langkawi the shore may be approached to a depth of 5 fathoms. 25

PULO TELIBONG, a large triangular island, 1,060 feet high, about 20 miles south-eastward of Pulo Lantar, and $18\frac{1}{2}$ miles eastward of Pulo Mohea, is high on its west and south sides, and low on the north and east sides; its summit, on the south end, is 1,060 feet in height. The island is separated from the mainland by a channel 2 miles in breadth, in the western entrance to which there is a bar with low water depths of about 2 fathoms; the eastern portion of the channel is blocked by sandbanks, which are mostly dry at low water, and the southern approach to it is much encumbered with rocks. Koh Nok, a rock 20 feet high, lies near the middle of the sandbanks in this entrance. 30

Kok Kang, a small rocky island off the south-west point of Telibong, is connected with that island by a reef, which dries at low water. 35

Light.—A light is exhibited on the northern coast of Telibong at about half a mile westward of its eastern extreme, and near the Customs-house. See Light list. 40

Off-lying shoals.—Between Pulo Telibong and Koh Kadan (page 159) are the following dangers: A group of rocks, 6 feet high, situated $5\frac{1}{2}$ miles, 296° true, from the south end of Pulo Telibong.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Shoal rocky ground (marked P.D. on chart) lies $4\frac{1}{2}$ miles, 271° true, from the south end of Telibong; and a third shoal, awash at low water, 3 miles, 150° true, from the south end of Telibong.

- 5 The 5-fathoms contour line extends about 10 miles off-shore, or out to a line joining Pulo Telibong and Darby and Joan, $5\frac{1}{2}$ miles to the southward.

Anchorage.—Good anchorage may be obtained during the north-east monsoon period, in 6 fathoms water, with the south extreme of Telibong bearing 37° true, distant $1\frac{1}{2}$ miles, avoiding the rock awash at low water on the north side of the approach. Vessels should not seek shelter eastward of the point during the south-west monsoon.

10 **KWALA TARANG** (*Lat. $7^{\circ} 18' N.$, Long. $99^{\circ} 28' E.$*).—Within Pulo Telibong there is a large bay, into which two rivers discharge; this bay is encumbered with rocks and sandbanks, of which the greater part are visible at low water.

Tarang, the northern river, may be approached by very light draughts, with local knowledge, either northward or eastward of Telibong; the northern channel can only be used by light draughts at high water, and is nearly dry at low water, as before stated; the eastern has, between the rocks, apparently not less than about 2 fathoms as far in as the lighthouse at the east end of Telibong, within which the depth is about 2 fathoms for a short distance.

15 Tha Klua is the fishing village on the west side of the river mouth where river pilots may be obtained. Tarang river has a general north and south direction, and apparently extends upwards of 20 miles inland; it is narrow and tortuous, with from 3 feet to 4 fathoms in places at low water spring tides. The channel is marked by beacons or stakes, available with local knowledge.

30 **Towns.**—The old town of Tarang, where the Governor formerly resided, is 13 miles up the river. Kontani is a Chinese town 3 miles above Tarang, to which it is said vessels of 12 feet draught could navigate in the wet season; however, only very light draught steamers use this river.

35 Guntan, a new town, has been built 8 miles below Tarang, on the left bank, to afford greater facilities for trade, and the seat of government has been removed to this place (not charted). It is to be the terminus of the Siamese Southern State Railway, under construction.

40 **Exports.**—The exports include live pigs, tin, and attaps, made from the dunny palm for roofing purposes.

Kwala Plien (Palean) enters the bay just eastward of Kwala Tarang, and, at its entrance, and for some distance up, is stated to have depths of from 3 to 5 fathoms, but it is not borne out by the

General charts 830, 70

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

chart, and the depths are considerably less in the approach, which are the same as far as the Tarang. A steam vessel of 12 feet draught, it is stated, can ascend about $1\frac{1}{2}$ miles at three-quarters flood, at which distance there is a fishing village, and one of 6 feet draught to about 15 miles at high water. Plien or Palean is charted about 10 miles up. 5

Trade.—Tin and pepper are exported, several other minerals are also found, and coal is obtained in considerable quantities, but possibly of the same poor quality as that near the Ghirbi (page 157).

COAST.—From the mouth of the Kwala Plien the coast trends southward for about 22 miles, to Tanjong Lana, 266 feet high to the tops of the trees, which, being higher than those in the vicinity, render it conspicuous from seaward, presenting the appearance of an island. The Paknam Lewang and Pak Kloug Te (Sungi Opi) discharge into the shallow water between the points mentioned. 15

Pulo Babi lies $3\frac{1}{2}$ miles off the entrance to the Paknam Lewang, in lat. $7^{\circ} 6' S.$, long. $99^{\circ} 35' E.$

From Tanjong Lana the coast continues in a southerly direction for 6 miles, to Tanjong Durio, being indented with several bights, and in some parts rising to moderate elevation. None of this coast has been surveyed. 20

Off-lying islands and dangers.—Pulo Liang is the name given to the two islets Darby and Joan, forming the north extreme of the chain of islets and rocks, 26 miles in length, and some 10 miles from the coast, which is almost continuous to Pulo Terutau. 25 Joan, the northernmost, is 700 feet high, bold, and precipitous, and lies 6 miles southward of Pulo Telibong and forms the south side of the approach to Tarang and Plien rivers. Darby, distant 2 cables to the southward, is of the same character.

Koh Krachome Fai, or Pulo Umbut (*Lat. $7^{\circ} 5' N.$, Long. $99^{\circ} 23' E.$*), is a small islet, nearly covered with clumps of small bamboos, situated 3 miles south-westward of Darby islet. 30

Light.—A light is exhibited from a light-tower on the eastern side of Koh Krachome Fai. See Light list.

A rock, 14 feet high, is situated 6 cables south-south-eastward of Koh Krachome Fai. 35

A reef, covered at high water, extends $1\frac{1}{2}$ cables northward of this rock, and the same distance south-westward of it.

Tukan Chukap, a small rocky islet with two peaks, 139 feet high, is situated $3\frac{1}{2}$ miles eastward of Koh Krachome Fai; sunken rocks are charted north and south of it. 40

Pulo Kapai, the most remarkable island in this vicinity, is situated 5 miles south-eastward of Koh Krachome Fai; it is narrow,

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

and $1\frac{3}{4}$ miles long in a north and south direction, being rocky and steep-to, except off a sandy beach on the eastern side.

- 5 A chain of precipitous peaks runs down the centre of this island, the northern of which is 873 feet high, and the southern 432 feet high, between these the summit attains an altitude of 1,251 feet.

. A perpendicular rock, 170 feet high, is situated $1\frac{1}{2}$ miles westward of Pulo Kapai, and a similar rock, 390 feet high, at 2 miles south-westward of that island.

- 10 **Gull rock**, 5 feet high, is situated about $1\frac{1}{2}$ miles north-eastward of Pulo Kapai; between them are indications of the existence of a shoal.

Pulo Mera is a sparsely-wooded islet, 138 feet high, lying about $3\frac{1}{2}$ miles eastward of Pulo Kapai.

- 15 A rock, awash at high water, is situated 2 cables north-westward of Pulo Mera, and two small islets close together, 63 and 65 feet high, are situated about 6 cables eastward of that islet.

- A rock, 11 feet high, is situated about one mile south-eastward of Pulo Mera, with a reef drying 7 feet at low water springs close north-
20 westward of it, and a rock awash at high water south-eastward of it.

Pulo Tabai, 720 feet high, is a steep islet lying $3\frac{1}{4}$ miles southward of Pulo Kapai; a perpendicular rock, 197 feet high, is situated $3\frac{1}{2}$ cables north-north-westward of it.

- Easy rock**, 40 feet high, lies $4\frac{1}{4}$ miles south-eastward of Pulo
25 Kapai.

- Pulo Pisang**, nearly half a mile long in an east and west direction, is situated about $3\frac{1}{2}$ miles eastward of Easy rock, and 6 miles off Tanjong Lana, the nearest shore; it is thickly wooded, and 207 feet high to the top of the highest conspicuous tree. A small rock, 5 feet
30 high, lies close off the eastern extremity.

Fail rock, 118 feet high, steep and bare, is situated $2\frac{1}{4}$ miles southward of Easy rock.

- An island, with a rock awash off the south extreme, and a shoal of 2 fathoms off the north extreme, is charted $2\frac{3}{4}$ miles eastward of
35 Fail rock.

Tukan Tiga is the name of a group of three small rocky islands near each other, situated about 4 miles south-south-eastward of Easy rock.

- The northern islet is 342 feet high, the southern, 318 feet high,
40 and the centre islet has two sharp peaks, 268 feet and 253 feet high, respectively.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Pulo Lema, rising steeply to a height of 612 feet, is about a quarter of a mile long in a north-west and south-east direction; it is situated $5\frac{1}{2}$ miles south-south-eastward of Easy rock.

Pulo Mulun (*Lat. $6^{\circ} 50' N.$, Long. $99^{\circ} 32' E.$*) is the outermost of a line of islets and rocks extending over 10 miles from Tanjong Duri. It is about a mile long in an east and west direction, and three-quarters of a mile broad, is thickly wooded, steep, and rocky, except off the eastern side, from which shallow water extends $1\frac{1}{2}$ miles in a south-easterly direction. It is situated $8\frac{3}{4}$ miles southward of Easy rock, and is 615 feet high to the tops of the trees. 5 10

A rock, 7 feet high, standing on a rocky ledge, most of which is covered at high water, is situated about one mile northward of the east extreme of Pulo Mulun; a rock, 25 feet high, lies close off the south-west point of that island. 15

A thickly wooded islet, 364 feet high, is situated about 2 miles south of Pulo Mulun, and a similar islet, 239 feet high, at $2\frac{1}{4}$ miles south-westward of that island. Rocks above water outlie these islets.

North Cone islet, 433 feet high, is situated about 4 miles east-north-eastward of Pulo Mulun, and South Cone islet, 412 feet high, at $3\frac{1}{2}$ miles eastward of that islet. 20

Both Cone islets have well-defined wooded summits, and are together locally known as Pulo Kechil Mulun.

South-eastward of Pulo Mulun, and between that island and South Cone islet, many patches of 3 fathoms and less are situated, the depths in the vicinity being irregular. 25

Perse rock, with a depth of 6 feet, is situated $1\frac{2}{10}$ miles, 88° true, of South Cone island.

Pulo Anjing, the largest of this group, is separated at the northern point from Tanjong Duri, on the mainland, by a channel $1\frac{1}{2}$ cables wide. 30

This island is densely wooded, and has two conspicuous hills, of which the northern and higher is elevated 892 feet.

Pulo Bulan, a narrow island 388 feet high, and about $1\frac{1}{4}$ miles long in a north and south direction, is separated by a narrow channel from Pulo Anjing. Westward of Pulo Bulan, rocky islets and shoal patches of from one to 3 fathoms extend for about one mile; the outer and largest of these islets is 145 feet high. 35

Tides.—It is high water, full and change, at Pulo Kapai, at XIIh. 4m.; springs rise 9 feet, neaps 6 feet. 40

The diurnal inequality is most marked when the moon has its greatest declination, the highest high water following the superior transit when it has south declination, and the inferior transit when it has north declination.

General charts 830, 70.

Chart 842, Sayer island to Langkawi island. Var. $0\frac{1}{2}^{\circ}$ E.

Tidal streams alongshore.—Between Pulo Telibong and Pulo Babi, near the shore, the east-going stream sets towards the shore from 4 hours before high water to one hour before high water on the shore, and the west-going stream from 2 hours after high water to 5 hours after high water, attaining at springs a velocity of $1\frac{1}{2}$ knots.

At neaps the tidal streams are weak and irregular.

Off Pulo Kapai the north-east-going stream, setting towards Tarang river, runs from 5 hours before to half an hour before high water, and the south-west or out-going stream from half an hour after high water to 5 hours after. The maximum rate is about 2 knots, but at neaps the streams are weak and irregular.

Between Pulo Mulun and the islets immediately southward of it both streams are generally weak and irregular, but at springs the east-going stream was occasionally experienced from about 3 hours before until high water, and the west-going stream from about 2 hours to 5 hours after high water, attaining velocities of about $1\frac{1}{2}$ knots.

At a distance of 2 or 3 miles northward of Pulo Terutau, from 4 hours before to the time of high water the stream sets between north-east and south-east, and from 2 hours to 5 hours after high water between north-west and south-west; the maximum velocity is $1\frac{1}{2}$ knots.

Off the west coast of Pulo Terutau the streams are generally weak and irregular, the greatest observed velocity being one knot.

Charts 842, 793.

The coast south-eastward of Pulo Bulan, as far as Tanjong Gabus, a distance of 30 miles, has not been surveyed; Pulo Temalang, charted as being $3\frac{1}{2}$ miles in length, lies near the coast north-west of Tanjong Gabus. The depths are under 3 fathoms, apparently at $3\frac{1}{2}$ miles off-shore; a mangrove bush is charted on the flat at about 3 miles off. Kweh Kechil, 94 feet high, and Pulo Kweh, 220 feet high, are charted about midway between Pulo Temalang and the south end of Pulo Terutau, and other islets between them and Temalang.

PULO TERUTAU, the north point of which is situated in lat. $6^{\circ} 45' N.$, long. $99^{\circ} 39' E.$, $4\frac{1}{2}$ miles southward of Pulo Bulan, is a thickly wooded island, about 14 miles long in a north and south direction; it rises to a moderate elevation at the northern part, but the central and southern portions attain heights of 2,317 feet and 1,715 feet, respectively. Pulo Terutau is not permanently inhabited, except by one Malay family in Wanderer bay.

The north-west coast between North point and West point is formed by two sandy beaches, with steep rocky points intervening; between West point and Pyramid point, the south extreme, the coast is mostly steep and rocky.

General charts 830, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Belitung Besar, situated $2\frac{1}{2}$ miles eastward of Pyramid point, and off the south coast of Terutau, has a remarkable spire-shaped peak, 690 feet high; Marks islet lies between it and Terutau.

Sail rock, one mile southward of Belitung Besar, is a square rock 130 feet high, resembling a sail. A rock, 15 feet high, lies 4 cables north-westward of Sail rock.

The east coast of Terutau, excepting Wanderer bay, has not been examined.

Plan of Wanderer bay on 1143.

WANDERER BAY, on the east side of Pulo Terutau, being nearly landlocked, is sheltered from all winds. In the centre of the bay is a conspicuous rock, 175 feet high, with white patches on its eastern side; it forms a good mark when making for the anchorage. North and South islands mark its extremes.

Anchorage.—Good anchorage may be obtained, the best position being in the centre of the bay, from one cable to 2 cables north-westward of South island, as a mudflat, nearly dry at low water neaps and somewhat steep-to, extends about 3 cables off Pulo Terutau towards South island, leaving a channel between of about $1\frac{1}{2}$ cables in width, with a depth of 5 fathoms.

Directions.—Steer for the anchorage with the Conspicuous rock 175 feet high, near the shore, bearing about 250° true, and anchor in from $3\frac{1}{2}$ to 4 fathoms water when the north extreme of South island bears about 130° true, or from that position steer towards the west extreme of the island, near which there is a depth of 5 fathoms.

Supplies.—There is a small Malay village named Petok Wau, situated within the mouth of the creek abreast South island, also a few Chinese fishermen curing fish for export. There are a large number of wild pigs on the island, and some were shot in the clearing around the village. Fish may be obtained with the seine; the best place, most clear of rock, is the neighbourhood of Bold point, and here is a stream of good water.

Stakes.—Two stakes are placed about 4 cables northward of South island, and a stake surmounted by a flag on the south side of the entrance to the creek—probably fishing stakes, and subject to alteration.

Tides.—See page 165.

The flood stream runs northward for 6 hours, and the ebb to the southward, at the rate of about one knot at neaps.

Chart 793, Butang group to Pulo Berhala.

BUTANG GROUP, a group of islands lying between 15 and 27 miles westward of Pulo Teratau, is well wooded, and, until

General charts 842, 70, 830.

Plan of Wanderer bay on 1143. Var. $0^{\circ} 3^{\circ}$ E.

within a few miles of them, appears as one large island; they are steep-to, having no anchorage except between them off the south side of the large western island, Pulo Rawi.

- 5 Coming from the north-westward, Dome mountain, on Pulo Adang, is seen over the eastern part of Pulo Rawi, which is flat-topped, the peak of Pulo Butang showing west of it.

Water is plentiful on the large islands.

- Observatory islet** (*Lat. $6^{\circ} 30' N.$, Long. $99^{\circ} 11' E.$*), on the south-west side of the group, is 94 feet high, and steep-to. Between Observatory islet and Pulo Butang are seven islets or rocks from 100 to 206 feet high, having no safe navigable channel between them.

Pulo Butang shows with a sharp summit, 928 feet high, when seen from the north-east or opposite direction.

- 15 Anchorage may be obtained off the south-west side of the island in 11 fathoms water, over sand and shells, one-third of a mile off-shore.

- Pulo Rawi**, the eastern peak of which is 1,594 feet high, and flat-topped, is separated from Pulo Butang by a channel a quarter of a mile wide. A small islet is situated close to the north-west point, to which it is joined by a reef dry at low water.

Water.—A cascade of good drinking water will be found on the west coast, half a mile south of the north-west point, and is a convenient watering place.

- Pulo Adang**, the eastern of the two large islands, has a long sandy beach on the west side, fronted by a coral reef which extends one cable off. A rock, 98 feet high, lies 9 cables eastward from the north-west point of Adang.

Dome mountain (*Lat. $6^{\circ} 32' N.$, Long. $99^{\circ} 18' E.$*), 2,315 feet high, on the southern part of Pulo Adang, is conspicuous from all directions.

- 30 **Pulo Beisi**, a narrow island one mile in length and 424 feet high, lies $1\frac{1}{2}$ miles off the north-east point of Adang. A high rock lies $1\frac{1}{2}$ cables off its south extreme, and a rock, 60 feet high, lies 3 cables south-eastward of it.

- Pulo Nipis** is separated from the south side of Pulo Adang by a shallow channel three-quarters of a mile wide; it has two hills, the western, 385 feet, being the higher. A rock, 12 feet high, lies one mile north-east from Pulo Nipis, and one 55 feet high nearer the island.

- Pin islet and reef.**—Pin reef is a narrow ledge, steep-to, one cable in length, with a rock 7 feet high; it is situated $3\frac{1}{4}$ miles eastward of Pulo Nipis. Between it and Nipis is a rock 202 feet high.

Tides.—It is high water, full and change, at the Butang group, at Xh. 34m.; springs rise 9 feet. The tidal streams are irregular, and much influenced by winds and local causes.

General charts 793, 842, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Pulo Tenga lies about midway between the Butang group and Pulo Terutau, and is formed by two portions connected at low water by a reef. The island is about 2 miles long in a north and south direction, thickly wooded, and steep-to, except on the east side, which 5 is fringed by a narrow reef.

Pulo Tenga is 650 feet high to the tops of a conspicuous clump of trees, which marks the summit.

Pulo Suku, a small islet almost surrounded by a coral reef, is situated three-quarters of a mile eastward of Pulo Tenga, the channel 10 between them being free from dangers, but marked by tide-rips.

Osborne rock, 3 feet high, is situated $4\frac{1}{4}$ miles north-westward of West point, Pulo Terutau. The channel between Pulo Terutau and Pulo Tenga is otherwise free from dangers.

PULO LANGKAWI is separated from Pulo Terutau by 15 Langkawi sound, nearly 4 miles wide, with depths over 10 fathoms. The island is mountainous, formed and flanked by towering masses of limestone, and thickly wooded.

Gunong Raya (*Lat. $6^{\circ} 22' N.$, Long. $99^{\circ} 49' E.$*), 2,888 feet in height, the summit of the island, is situated near the middle of the 20 island; it is densely wooded, and viewed from the westward makes as three peaks:

Gunong Chinchang, or serrated mountains, rise abruptly from the western coast, the summit being precipitous and rocky. The western 25 and highest peak of the ridge is 2,348 feet high; the others are 2,205 and 2,308 feet in height. Tanjong Gamarau, 379 feet high, is the north-east point of the island; Pulo Cookson and Pulo Padak, 960 and 665 feet high, respectively, are situated on the flat which extends from Tanjong Gamarau and along the east coast as far as Tanjong Temion, 493 feet high. 30

Villages.—Pulo Langkawi and the adjacent islands are subject to the Raja of Kedah. The valleys and plains are well cultivated with rice, sugar, &c., and hot springs have been found near Tanjong Gamarau. The natives are peaceable and friendly, and there are numerous villages, the principal one being Kwah, situated at the head 35 of Bass harbour; it has a considerable population of both Malays and Chinese, principally fishermen.

The next in importance is situated about half a mile from the mouth of a stream which empties at the north-east corner of Kwala Malacca, on the west coast, and is said to contain 4,000 inhabitants, many of 40 whom are Chinese; it is, or was, the residence of the chief.

Supplies.—Trade.—Fowls, eggs, and other small supplies can be obtained for silver dollars. Wild pigs are numerous, and the Argus pheasant is occasionally seen. Trade is carried on with Penang and 45 the mainland by junks; Siamese gunboats occasionally visit the island.

General charts 842, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Kwala Malacca (*Lat. $6^{\circ} 27' N.$, Long. $99^{\circ} 38' E.$*).—From Tanjong Tukan Raja, the north-west point of Pulo Langkawi, the coast trends for 5 miles in a southerly direction, to Tanjong Bongkot Pennyu or Dolphin nose; it is rocky, with a few sandy beaches, backed by precipitous mountains covered with jungle. Between Tanjong Bongkot Pennyu and Pulo Rebah is Kwala Malacca, protected from winds between S.S.E., through east, to North, and affording good anchorage for small craft; the north shore of the bay is rocky.

At one mile eastward from Tanjong Bongkot Pennyu is an islet or rock, connected with the shore by a reef, and the bight eastward of the islet is known as Burau (old well); about $1\frac{1}{2}$ miles inland, at the foot of a precipice, are several old wells, from whence the name arises.

At the head of the bay is a long sandy beach, fronted by a bank of soft mud, rendering landing impracticable at low water except off the mouths of the two streams. The beach is backed by a fringe of jungle, behind which are several villages surrounded by cultivated land.

Pulo Rebah, off the south extreme of Kwala Malacca, is a flat-topped island 551 feet high, having a conspicuous red landslip on its north-west side. A rock, which uncovers at low water, lies about half a cable from the north-west point, and a reef extends the same distance south of the south-west point, of the island.

A rock or islet, 235 feet high, lies off the east side of Pulo Rebah, having a reef extending $2\frac{1}{2}$ cables from its western point. A rock, 57 feet high, lies between this islet and Rebah.

From the point abreast of Pulo Rebah, a sandy beach trends to the southward for $2\frac{1}{2}$ miles to Tanjong Sawah, in the centre of which is a conspicuous bluff fronted by a low spur of the hills behind. An island with two rocks off its north-west extreme lies close eastward of the point. Pulo Tepur lies close north-westward of Tanjong Sawah.

BASS HARBOUR, formed between the south coast of Pulo Langkawi and the north coast of Dayang Bunting, affords anchorage for small craft, with complete protection. It is 7 miles in length, with an average breadth of $1\frac{1}{2}$ miles, and a general depth of 3 to 4 fathoms, over mud bottom; its eastern entrance is known as Selat Kwah or Bass strait. It is apparently barred, with a low water depth over it of 6 feet. The western entrances, Tyson strait and that northward of Pulo Singha Kintut, have apparently not less than 3 fathoms, which is found on the bar stretching eastward of Tanjong Sawah. They are available for craft with local knowledge.

From Tanjong Sawah the coast trends north-eastward for $6\frac{1}{2}$ miles to a long sandy beach, being a succession of rocky points with sandy bays between them, and backed by hills rising to a height of 726 feet. Along this coast are a few villages; the principal is Kwah, on the east side of the head of the harbour.

General charts 842, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

The south-east shore of Bass harbour is bold; some of the cliffs are broken and irregular, rising abruptly from the water.

Within one mile eastward of Tanjong Sawah are three islets, and a rock about one foot high; the highest and easternmost islet is Pulo Lalung, 157 feet high. 5

Reefs.—The following dangers lie in the western entrance to Bass harbour:—

A reef, about $1\frac{1}{2}$ cables in extent, and drying in places at half ebb, northward of the fairway of the south-west entrance to Bass harbour, with the east extreme of Pulo Singha Kintut, bearing 242° true, distant about $1\frac{1}{2}$ miles. 10

A reef, of small extent, with a depth of about 2 feet at low water spring tides, lies 18° true, distant about 4 cables from the above reef.

Vessels should pass southward of these dangers. 15

Pulo Singha Kintut (Lat. $6^{\circ} 15' N.$, Long. $99^{\circ} 43' E.$), one mile south-westward of Tanjong Sawah, is 397 feet high, with a double hill.

Pulo Bras Basah, southward of it, has a sharp, well-defined summit, 828 feet high; $1\frac{1}{2}$ cables eastward of the south point of the island lies a rock which uncovers at half ebb. 20

Pulo Lada, the south-western island of the group, is hilly and covered with thick jungle. The highest peak, 1,006 feet, situated near the southern end, is well defined.

The east coast of the island is indented, with fringing reefs extending about one cable off-shore. 25

Pulo Chupak, a wooded islet, 100 feet high, lies 4 cables southward of Pulo Lada, with deep water in the channel between.

Pulo Dayang Bunting is mountainous, with many rugged and peculiar limestone peaks, the summit of which is 1,571 feet in height; the eastern portion is known as Tubah. Off the western side of the island are several steep rocky islets, and its north extreme is Tanjong Tirei, the whole forming the eastern shore of Bass harbour. The coastline of these islands is formed of high perpendicular cliffs, which, in common with most of those off this coast, are undermined below high-water mark for some distance. 30 35

Tyson strait, between Pulo Lada and Pulo Dayang Bunting, is the south-western entrance to Bass harbour. In the middle of the strait is a mudbank, $1\frac{1}{2}$ miles in length in a north and south direction, and one mile in breadth, under the depth of 3 fathoms, the least water being 13 feet. 40

General charts 842, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Canister rock (*Lat. $6^{\circ} 10' N.$, Long. $99^{\circ} 46' E.$*), a small square-shaped rock, 68 feet high, is the outermost of the group of islands in the south-east part of Tyson strait.

- 5 Junk rock, 188 feet high, in the north part of Tyson strait, at its junction with Bass harbour, is square-shaped and precipitous.

Tides.—It is high water, full and change, in Tyson strait, at 0h.; springs rise 8 feet. The flood tide runs to the southward out of Bass harbour from one half to one knot, and the ebb stream the reverse
10 way.

Current.—In the offing, the current generally sets to the northward during the south-west monsoon, and to the southward during the north-east monsoon.

- COAST.—Paknam or Kwala Satul** (*Lat. $6^{\circ} 30' N.$, Long. $100^{\circ} 5' E.$*) lies about 10 miles north-eastward of Pulo Langkawi, within Tanjong Gabus, and northward of Kwala Perlis, and is well sheltered by the islands from the south-west monsoon. It has not been surveyed. From former reports, a vessel of 15 feet draught, if in charge of a pilot, might enter the river at high water and reach the
20 town of Satul, about 10 miles above the entrance. Above the town the river is shallow.

Kwala Perlis entrance lies about 6 miles southward of Paknam Satul; coasting vessels anchor off it in 3 fathoms water, south-westward of a group of four islands named Panjang, Kuning, Kurap, and
25 Brasmana, which lie near the mainland on a mudflat; the mudbank fronting the coast here is very flat. There is said to be a depth of 12 feet at high water in the channel over the bar off the entrance.

Junks of 5 to 6 feet draught trade to Kanga, the capital, 4 miles from the mouth of the river. Polit or Perlis is situated apparently
30 about 10 miles up.

Bukit Perlis, 670 feet high, 2 miles eastward of the entrance, should be a good mark for making the river.

Lights.—A light is shown from the south side of entrance to Kwala Perlis at a height of 25 feet. A light, unwatched, is shown
35 from the south end of Pulo Panjang at a height of 268 feet. Details of light-structures are not furnished. See Light list.

KEDAH RIVER (Paknam Muang) (*Lat. $6^{\circ} 6' N.$, Long. $100^{\circ} 17' E.$*), the entrance to which is in about 20 miles southward of Kwala Perlis, has a low water depth of about $1\frac{1}{2}$ feet in the
40 channel over the bar.

The navigation of the river to Saiburu or Alostar presents no difficulty to vessels that can enter if in charge of a pilot. It is necessary to moor head and stern there.

General charts 842, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Light.—A light is shown from a white tower with blue top, erected on the north entrance point. *See* Light list.

Buoys.—A white bell-buoy is established at about three-quarters of a mile south-westward of the lighthouse. 5

A white buoy is established on the bar within the bell-buoy (not charted).

Directions.—Vessels should pass close northward of the bell-buoy and steer towards the lighthouse until abreast of the second buoy, when course should be shaped for the centre of the entrance to the river. 10

Town.—**Alostar**, or Saiburu, the principal town in Kedah province and residence of the Sultan, is situated about 5 miles up the river, and has a population of about 6,000. *See* Kedah state, pages 9, 10. 15

From the landing place near the Custom-house, a good road extends about 6 miles in a northerly direction, on which are some very fair houses, a club, and the British Residency. This road leads to Singora, 12 miles from Alostar. The district is purely agricultural.

Communication.—The town is connected with the police-station on the north side of the entrance by telephone, and there is telegraphic communication with Penang and Singora. 20

A railway is begun from Province Wellesley to Alostar, the capital, to be extended to Perlis. (*See* page 10.) Daily communication with Penang by small steam vessels. 25

Outer anchorage.—There is anchorage, in about 4 fathoms water, at 3 miles off Kedah river.

Tides.—It is high water, full and change, at 0h.; springs rise 9 feet.

Bukit Geriang or Elephant mountain, 780 feet high, is an isolated mass of limestone, honeycombed with caves, situated 5 miles north-eastward of Kedah river entrance, and is a good mark for making that river. It has the appearance of an elephant kneeling, with its head to the southward, particularly when bearing north-eastward. There is a smaller hill to the northward of it. 30 35

OFF-LYING ISLETS.—**Pulo Sagantang** (*Lat.* $6^{\circ}21'N.$, *Long.* $99^{\circ}55'E.$), a high rock, lies about 22 miles westward of Kedah river and 10 miles south-east from the south extreme of Pulo Dayang Bunting. There are depths of 16 fathoms close to its north and east sides, and 19 fathoms 2 miles south-west of it. 40

Pulo Paya, lying $6\frac{1}{2}$ miles eastward from Pulo Sagantang, is high, about one mile in length, 3 cables in breadth, and steep-to, with the exception of part of the north-east side. At one mile south-

General charts 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

west of the island there is a 5-fathoms patch, named Barat Dayah, and at one mile from the north-west side is Tokun Barat, another patch of 5 fathoms.

- 5 **Pulo Lembu**, about half a mile north-east of Pulo Paya, is about a quarter of a mile in extent, high, and foul on its north side to the distance of 2 cables. In the channel between is Pulo Kacha, a rock about 3 feet high.

- 10 Near the islands of Paya and Lembu there are, with the exceptions mentioned, depths of 13 to 16 fathoms within half a mile of the islands, and depths above 10 fathoms will be found until within 5 miles of the entrance of Kedah river.

- 15 **PULO PERAK**, or Silver island (*Lat. $5^{\circ}42'N.$, Long. $98^{\circ}57'E.$*), a peaked, barren, white rock, 394 feet high, entirely devoid of trees, and the resort of numerous sea-birds, lies nearly midway in Malacca strait, between Jambu Ayer or Diamond point of Sumatra and Kedah river; it is steep-to, there being depths of from 40 to 50 fathoms within a short distance.

- 20 Pulo Perak is often taken as a point of departure, and when the weather is cloudy during the south-west monsoon it is not unfrequently the first land seen after entering Malacca strait from the northward. Sailing vessels should then give it a wide berth, for at that time calms and light airs are likely to prevail in its neighbourhood, during which vessels have been carried by the current towards
25 it, and have been obliged, it is said, to anchor in deep water to prevent being driven against the steep rock.

- COAST.**—From Kedah river the coast extends in a southerly direction for a distance of 26 miles to the entrance of Sungai Merbau (Merbuk), and continues low and wooded until within 8 or 9 miles of
30 that river, where Gunong Jerai or Kedah peak, 4,019 feet high, is situated at a distance of 4 miles from the coast, in lat. $5^{\circ}47'N.$, long. $100^{\circ}26'E.$

- Bukit Choreh** or False Elephant mountain is 10 miles northward of Gunong Jerai, 17 miles southward of Elephant mount, and
35 7 miles inland; the head of the animal it somewhat resembles is situated to the westward and the hump to the eastward. Southward of Sungai Merbau, as far as the north entrance to Penang, the coast continues low.

- Dangers.**—At $5\frac{1}{2}$ miles, 172° true, from Kedah river lighthouse,
40 and 2 miles off-shore, there is a rock with a less depth than 6 feet over it and 4 fathoms close-to, and within the 5-fathoms contour line; 6 miles southward of this is Tokun Bavalla Banku, a rock awash at low water, lying $2\frac{1}{2}$ miles, 13° true from the west extreme of Pulo Bunting, and $1\frac{1}{2}$ miles from the shore.

General charts 1353, 1355, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

A mudflat, with depths of less than 3 fathoms, skirts the shore between Kedah and Merbau rivers, to the distance of about $1\frac{1}{2}$ to 2 miles, until abreast of Pulo Bidan, where the edge of the bank is $4\frac{1}{2}$ miles off; thence it gradually approaches the shore until abreast the north end of Pulo Penang, where it is about one mile distant. 5

BÚNTING ISLANDS consist of Pulo Búnting, Pulo Songsong, Pulo Telor, and Pulo Bidan, the whole of which are barren. Depths of from 10 to 12 fathoms will be found 3 miles seaward of them. 10

Pulo Búnting is 610 feet high, $1\frac{1}{4}$ miles in length, half a mile in width, and separated from the mainland by a channel one mile wide, with depths of from 6 to 9 feet. It is situated about midway between Kedah and Merbau rivers.

Pulo Songsong (*Lat. $5^{\circ} 48' N.$, Long. $100^{\circ} 18' E.$*), lying 4 miles south-south-westward from Pulo Búnting, is almost circular, about a quarter of a mile in diameter, and skirted by a reef to the distance of one cable. At one mile south-westward from Pulo Songsong are Songsong rocks, 25 feet high, and occupying a space of a quarter of a mile; there are depths of from 8 to 10 fathoms a short distance from the rocks. 15 20

Pulo Telor lies $2\frac{1}{4}$ miles southward from Pulo Songsong, and is skirted by a reef. Depths of 7 fathoms are found between the two islands, and the water shoals gradually towards the shore.

Pulo Bidan lies one mile south of Pulo Telor, and is two-thirds of a mile in length by a quarter of a mile in breadth; the island is almost encircled by a reef. 25

Sungi Merbau, the entrance to which is formed between the low coast on the north and Merbau hills on the south, is fronted by the coast mudflat, which has depths under 3 fathoms, and extends nearly 3 miles to seaward. Old Kedah (Merbau) is situated on the north side of the entrance, and off the south point is Pulo Sayer (Sayak), 274 feet high. 30

A depth of 8 feet at low water is reported on the bar, with 18 feet inside; as far up as the town of Similing, a distance of about 10 miles, there is a depth of 8 feet at low water. A steamer from Penang calls at Similing every day. 35

Kwala Muda (*Lat. $5^{\circ} 34' N.$, Long. $100^{\circ} 21' E.$*), situated about 6 miles southward of Kwala Merbau, had a depth of about 10 feet on the bar at high water. A village stands on either point of the entrance, and a larger one at about 7 miles up the river, on the right bank. 40

Boundary.—Muda river is the boundary between Kedah state and Province Wellesley.

General charts 1355, 830, 2760, 70.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

CAUTION.—Fishing stakes.—In passing between Kedah river and Penang during the night, care must be taken to keep clear of the numerous fishing stakes which are fixed in places on the banks
5 some 6 or 7 miles from the land.

Chart 1366, Penang harbour and approaches.

PULO PENANG is a British settlement nearly 14 miles in length in a north and south direction, from 6 to 9 miles in breadth, and has an area of about 107 square miles; it is separated from the main-
10 land by a strait from $1\frac{1}{2}$ to 7 miles in breadth, which affords sheltered anchorage for all vessels that can cross the bars of either entrance.

Georgetown, the capital, is situated at the north-east extreme of the island.

Province Wellesley, on the shore of the mainland, forms part of
15 the settlement, also the Dinding islands, and a small portion of the mainland abrest them. *See* also page 7.

Banks, with depths under 3 fathoms, extend $1\frac{1}{2}$ miles northward, $2\frac{1}{2}$ miles westward, and $3\frac{1}{2}$ miles southward of the island; eastward of the island between it and the mainland is Penang harbour.

20 Owing to the vicinity of Penang to the Bay of Bengal, the influence of the monsoons is more distinctly felt there than in any other of the Straits Settlements.

Aspect.—The north part of Pulo Penang is mountainous, and through the centre of the island runs a range of hills, declining in
25 height as it approaches the south-west extremity, but two-thirds of the whole surface of Penang is level and of gentle inclination, and, like the hills, is well-wooded. Western hill (*Lat. $5^{\circ} 25' N.$, Long. $100^{\circ} 15' E.$*), the highest point of the island, is 2,724 feet high; at a short distance to the eastward is Government hill, on which stands
30 a signal flagstaff, about 2,550 feet above high water. The western side of the island is low and wooded. *See* view on chart 1366.

PENANG HARBOUR.—Depths in entrances.—North channel, the northern entrance to Penang, is at all times preferable, there being a depth of $4\frac{1}{4}$ fathoms in the fairway as taken by
35 the pilots, at low water springs. *See* North channel, below.

South channel, the southern entrance channel, has a depth of $3\frac{3}{4}$ to 4 fathoms in its entrance, but abreast No. 5 beacon is a short bar with only 3 fathoms at low water spring tides. Springs rise about 9 feet, neaps 7 feet.

40 Vessels of 18 feet draught can enter at low water.

NORTH CHANNEL is nearly 11 miles wide in its entrance, between Muka head, the north-west extreme of Pulo Penang, and the entrance to Kwala Muda on the mainland. A mudflat or bar, with general depths of about $3\frac{1}{2}$ fathoms, extends right across, but the
45 central portion, about $1\frac{1}{2}$ miles in extent, has depths of $3\frac{3}{4}$ to

General charts 1355, 830, 2760, 70.

Chart 1366, Penang harbour and approaches. Var. $0\frac{3}{4}^{\circ}$ E.

$4\frac{1}{2}$ fathoms; the bottom is mud. It is stated that the pilots can take a vessel in of 26 feet draught at any state of the tide. From abreast Pulo Tikus the fairway gradually deepens from about 6 fathoms to 8 to 13 fathoms in the harbour.

The coast of the mainland being low, though covered with trees, is not so conspicuous as that of the island, consequently the latter will generally appear nearer when in the fairway between them. *See view on chart 1366.*

Plan of Penang harbour 3732, and 1366.

Harbour mark.—Pulo Tikus, or Rat island, is situated about half a mile off the southern shore, at about one mile north-west of Tokong point. Rocks above and below water extend about $2\frac{1}{2}$ cables inshore of it.

A white obelisk stands on Pulo Tikus; it is one of the harbour marks.

Light-buoy.—A red Wigham oil-buoy, exhibiting an *occulting red* light, is moored on the south side of the fairway over the bar in about 4 fathoms at $3\frac{1}{4}$ miles, about 339° true, from Pulo Tikus.

Buoys.—A red buoy, surmounted by an iron plate with the word "Cable" cut out of it, is moored in about 4 fathoms, at $6\frac{3}{4}$ cables, 343° true, from Fort Cornwallis light to mark the bend of the telephone cable. Two red buoys with balls mark the 3-fathoms contour line between it and the fort.

A black and white conical buoy is moored at about $1\frac{3}{4}$ cables distant from the north end of Swettenham pier; it marks the south-west extreme of the Man-of-war anchorage; an occasional *red* light is shown from it.

A white buoy, in about 11 fathoms, is moored about one cable south-eastward of the south end of Swettenham pier. For buoys southward, *see* South channel.

A quarantine buoy, painted red and yellow in vertical stripes, is moored on the eastern side of the channel in about $5\frac{1}{2}$ fathoms, at $1\frac{1}{10}$ miles off Chura village.

LIGHTS.—Muka head.—From a grey granite tower, 45 feet high, erected on the summit of Muka head, is exhibited a light. *See* Light list.

Fort Cornwallis.—From a white iron pile tower, 70 feet high, erected on the north-east bastion of Fort Cornwallis, a light is exhibited 87 feet above high water, which should be visible from a distance of 15 miles. For details, *see* Light list and charts.

Swettenham pier.—Lights are exhibited from the ends of Swettenham pier.

Victoria pier, Church Street pier, and Railway pier, southward of Swettenham pier, are lighted, as charted.

Telephone cable.—*Red fixed* lights are exhibited from a white beacon erected close to the harbour limit mark at Bagan Jermal on the opposite shore, and from a white beacon erected on the inner bank

General charts 1355, 830, 260, 70.

Plan of Penang harbour 3732, and 1366. Var. $0\frac{3}{4}^{\circ}$ E.

3 cables seaward of it; these in line mark the telephone cable and the centre of the prohibited anchorage ground.

Tugs.—There are about 6 tugs available.

- 5 **Pilots.**—The employment of pilots is optional, but it is always to a vessel's advantage to employ one, as they have the knowledge of the best available berths and those which will be shortly vacated. Pilots for the North channel board vessels seaward of the fairway light-buoy northward of Pulo Tikus, and on receipt of telegraphic
10 advice will meet and bring vessels in at any time of day or night. Those for South channel board vessels near No. 9 buoy, seaward of Pulo Rimau, when advised by telegraph of the time of vessel's expected arrival. Pilots for Kwala Larut may be obtained at Penang. The pilot steam launches are painted white, and fly a flag,
15 upper half white, with a blue "P" in it, and the lower half red; at night a red light is shown.

Pilots are obtainable for Port Swettenham and the Langkawi islands.

Pilotage dues. —1.—(a) Vessels entering or leaving by		\$ c.
20	North channel, per foot draught	1 25
	(b) Entering or leaving by South channel, per foot draught	1 50
	(c) To be added to (a) or (b) if also taken to or from alongside any wharf or pier (Kwala Prai excepted), per foot draught	0 50
25	(Minimum charge)...	10 00
	2. Where vessel employs no pilot entering or leaving port:—	
	Only to or from alongside any wharf or pier from or to any other berth (Kwala Prai excepted)	15 00
	3. Only mooring or unmooring, including shifting berth...	10 00
30	4. (a) To or from any berth in Kwala Prai from or to any other berth when not employing a pilot entering or leaving, per foot draught	1 20
	(Minimum charge)...	20 00
	(b) To or from any berth in Kwala Prai from or to any other berth when employing a pilot entering or leaving port	15 00
35	5. Detention per hour completed	5 00
	6. Extra for night fee, 6-30 p.m. to 5-30 a.m.—	
	(Standard meantime)...	10 00
40	7. Lighter in tow of a tug or steam launch	15 00
	Every extra lighter under same tow, each	5 00
	8. Sailing vessels 2,500 tons net register and under entering or leaving North or South channel'	35 00

In all cases a fraction of a foot will count as one foot.

- 45 **Tides.**—It is high water, full and change, at 0h. 21m.; springs rise $6\frac{3}{4}$ feet, neaps $4\frac{1}{2}$ feet. At Pulo Rimau in the southern entrance it is high water about three-quarters of an hour later. At the change

General charts 1355, 830, 2760, 70.

Plan of Penang harbour 3732, and 1366. Var. $0\frac{3}{4}^{\circ}$ E.

of the monsoons in May, the tides at full moon have less range than at new moon; the lowest day tides occur in February and March.

Tidal streams.—At springs the tidal streams run at the rate of 2 to 3 knots an hour, through the harbour anchorages, but less in the approaches. During the north-east monsoon the tidal streams are regular, the flood or southerly stream running from about 2 hours after low water to about 2 hours after high water by the shore; the ebb the reverse.

In November the current formed by the south-west monsoon sets round Muka head and overcomes the ebb stream, sometimes for 2 or 3 days.

In the offing between Penang and Parcelar hill the tidal streams during springs are regular, the flood setting to the south-east, the ebb north-west, at the rate of $2\frac{1}{2}$ or 3 knots an hour; the turn of the stream is probably the same as mentioned above. During neaps there is no perceptible stream.

DIRECTIONS.—Fishing stakes extend in places some $2\frac{1}{2}$ miles northward of the north extreme of Pulo Penang, forming some guide to the fairway channel, but a good berth should be given to them, as many may be broken off some feet under water. Pass about a mile northward of the light-buoy, steering about 135° true, until the outer buildings on the point northward of Prye (Prai) river bear 160° true, when they should be steered for until abreast the telephone buoy, when course may be altered for the desired anchorage. Sailing craft may work in by the lead, avoiding fishing stakes.

By night.—Muka head light, bearing southward of 225° true, leads westward of the fishing stakes, and Fort Cornwallis light, bearing southward of 158° true, leads eastward of them, and, with the light-buoys, these lights afford a sufficient guide to the anchorages.

Harbour limits.—The limits of the Port of Penang are defined as follows: From the white obelisk on Pulo Tikus in a straight line to the harbour mark at Bagan Jermal in Province Wellesley, thence along the shore of Province Wellesley to the mouth of the Kwala Prai, thence up the right bank of the said river to the pontoon bridge, thence across that bridge and down the left bank to the mouth of the said river, thence along the shore to the harbour mark situated about $1\frac{4}{10}$ miles south-eastward of the entrance of Kwala Prai, thence due west as far as the southern harbour mark situated on the north bank of Sungi Glugor entrance, Pulo Penang, at $1\frac{1}{4}$ cables distance south of the white obelisk, thence along the shore of Pulo Penang to Tanjong Bunga, and thence in a straight line to the said obelisk on Pulo Tikus, including the Penang river as far as Dato Kramat bridge, and all creeks and waterways between the southern harbour mark on Pulo Penang and the obelisk on Pulo

General charts 1355, 830, 2760, 70.

Plan of Penang harbour 3732, and 1366. Var. $0\frac{3}{4}^{\circ}$ E.

Tikus, and including all piers, jetties, landing places, wharves, quays, docks, and other similar works within the limits above set out, whether within or without the line of high-water mark, and (subject to any
5 rights of private property therein) all portions of the shore or bank within 50 yards of high-water mark.

Wrecks.—A small sunken steamer lies 355° true, distant 5 miles from Muka head. A wreck lies in the anchorage off Georgetown at 5 cables, 46° true, from Fort Cornwallis lighthouse, marked by boats
10 and the usual lights.

ANCHORAGES.—The anchorage off Georgetown is situated in the narrowest part of the strait, which is here $1\frac{1}{2}$ miles in breadth; it is well sheltered and capable of accommodating a large number of vessels. There is deep water close to Fort point, and the water shoals
15 gradually towards the mainland from half a mile eastward of the fort.

The following limits are as defined by the Port Regulations:—

Vessels of war.—The space reserved for vessels of war is enclosed between a line running 90° true from the black and white
20 buoy north-eastward of Swettenham pier, a line running 0° true for a distance of $4\frac{1}{2}$ cables from the same buoy, and thence 90° true. The depths are from 6 to 10 fathoms; it is advisable to moor

Foreign-going vessels.—Subject to the provisions of these rules, foreign-going vessels in general shall anchor to the northward of
25 a line running 90° true from the north white-mark buoy (off Swettenham pier), and so as to swing clear of line drawn between the north white-mark buoy and the black-and-white-mark buoy; other vessels shall anchor to the southward of that line. To prevent accidents, all vessels anchoring among the shipping in the harbour, intending to
30 take in or discharge cargo, shall moor and keep a clear hawse.

Coasting steam vessels.—The anchorage for small coasting steam craft shall be off the Fort jetty and to the northward close inshore.

Native craft.—Anchorage for all junks, &c., engaged in the
35 coasting trade shall be inshore westward of the Middle bank, as charted. This is also the petroleum anchorage.

Prohibited anchorages.—Anchorage is prohibited in the undermentioned areas:—

(a) In the area comprised within a line drawn in a direction 119°
40 true from the white harbour mark on Pulo Tikus, until it is intersected by another line drawn 5° true from Fort Cornwallis flagstaff. The prohibited arc is between these lines and the north-eastern coast of Pulo Penang.

General charts 1366, 1355, 830, 2760.

Plan of Penang harbour 3732, and 1366. Var. $0\frac{3}{4}^{\circ}$ E.

(b) Within $1\frac{1}{2}$ cables northward or southward of the line of the telephone cables laid between the harbour mark at Bagan Jermal and the red telegraph buoy, moored 7 cables northward of Fort Cornwallis.

5

(c) Vessels are not permitted to anchor westward of a line drawn from the north white-mark buoy to the black and white-mark buoy placed off Swettenham pier. Vessels taking up positions outside or to the eastward of such line shall anchor so as to swing clear of such line.

No vessel shall anchor westward of the line of bearing Fort Cornwallis flagstaff, 186° true; nor in the prohibited anchorages shown on the Admiralty chart of Penang harbour; nor within 400 yards of the line of the submarine telephone cable laid between the obelisk north of Sungi Glugor entrance and that southward of Prai river, connecting Penang island with Province Wellesley.

10

15

Anchorage in the fairways is also prohibited.

Quarantine anchorages.—The quarantine anchorage for home-trade and local-trade vessels shall be within a radius of three-quarters of a mile of the north point of Pulo Jerejak, and as near as possible to it, whether to the eastward or within the channel to the westward of Pulo Jerejak, as charted.

20

The quarantine anchorage for foreign-going vessels is situated in the South channel on the east side of Middle bank to the westward of a line joining Swettenham pier and the white beacon in South channel, and with the south chimney of the Straits Trading Company's smelting works at Bagan Luar between the bearings of 82° true and 60° true.

25

Explosives anchorage.—The anchorage for vessels loading or loaded with explosives shall be with Fort Cornwallis flagstaff between the bearings of 271° and 260° true, and as close to the Province Wellesley shore as is consistent with safe navigation, and not in any case within 9 cables distance of Penang island. Such vessels are required to moor, and shall comply with any restrictions or conditions that may be imposed by the Port officer. They shall not anchor or berth elsewhere within port limits except with the permission in writing of the Port officer. Vessels carrying, loading, or discharging explosives shall hoist the code signal, flag "B.," at the masthead, and at night a red light in the same position.

30

35

Chart 1366, Penang harbour and approaches.

SOUTH CHANNEL, the southern entrance to Penang harbour is only half a mile wide abreast Pulo Rimau, between it and the 3-fathoms contour forming the edge of the mudflat extending from the eastern shore.

40

General charts 1366, 1355, 830, 2760.

Chart 1366, Penang harbour and approaches. Var. $0\frac{3}{4}^{\circ}$ E.

The depth on the bar situated about $2\frac{1}{4}$ miles seaward of Pulo Rimau was stated to be as little as 3 fathoms in 1912, but dredging was in progress; the chart shows a depth of $3\frac{3}{4}$ fathoms at low water, or with a foot or two of that in the North channel, but the latter is preferable for vessels of fairly deep draught. The mudflat extending southward of Pulo Penang, northern side of the approach, extends out a little beyond a line joining Pulo Kendi and Pulo Rimau, west side of the entrance. For Pilots, Tides, and Anchorages, *see* pages 178-181—North channel.

Islands and dangers.—Pulo Kendi, or Saddle island, situated nearly 2 miles southward of Tanjong Gertah Sangul, the south-west extreme of Pulo Penang, is high, about half a mile in length, and a quarter of a mile in breadth; the water is deep close south-westward of it.

Pulo Rimau, $5\frac{1}{2}$ miles eastward of Pulo Kendi, and on the eastern edge of the 3-fathoms contour, is situated on the west side of the entrance to South channel, and is steep-to on the channel side.

LIGHTS (*Lat. $5^{\circ} 11' N.$, Long. $100^{\circ} 17' E.$*).—A light is shown from an iron tower, 57 feet in height, erected on the south-east extreme of Pulo Rimau. For details, *see* Light list and chart.

Lights are also shown from Nos. 4 and 5 beacons.

Great Kra flat forms the eastern side of South channel; it fronts the shore at various distances from Pulo Talang in lat. $4^{\circ} 25' N.$, to abreast Kwala Prai, a distance of about 60 miles. Its edge is apparently extending, as a shoal of $1\frac{1}{2}$ fathoms is reported to lie with Pulo Kendi bearing 330° true, distant 10 miles. (Chart 793.)

Great Kra flat much encumbers South channel, and abreast Pulo Rimau is nearly 5 miles in breadth; it is dry in places at low water, and tapers to a point off Kwala Prai. A channel, with depths of 6 to 8 fathoms lies eastward of this extreme, leading to the Prai, Juru, and Butakawan rivers. Southward of these rivers and of the Kra islands, Kra flat again forms the shore bank, and there is no channel for vessels in that direction.

Batu Man flat, on the western shore, between Batu Man point and Pulo Jerejak, is dry in patches at low water. A rock 2 feet high lies one cable northward of Batuman point, and between the two northern prongs of the flat is a rock which barely covers at high water.

Pulo Jerajah, on the western side of South channel, is $2\frac{1}{4}$ miles in length, north and south, and from a quarter to three-quarters of a mile in breadth, rising in a pyramidal form to a height of 692 feet. There is a quarantine station and leper hospital on it, as mentioned with the sick quarters, page 186.

General charts 1366, 1355, 830, 2760.

Chart 1366, Penang harbour and approaches. Var. $0^{\circ}34' E$.

Middle bank extends northward from Pulo Jerejak for a distance of $4\frac{3}{4}$ miles, its northern end tapering to a point with depths under 3 fathoms to abreast Georgetown, as charted. It dries at low water to within about a mile of this extreme. Between Middle bank and the mudbank fronting Pulo Penang, westward of it, is a narrow channel with a depth of about 3 fathoms, but it is barred abreast Jerejak with a depth of about 2 fathoms.

Syrang bank lies eastward of Middle bank, a portion of which dries; it lies within the 3-fathoms contour, fronting Middle bank, and forms the western side of South channel for a short distance.

Buoyage.—The buoyage of South channel from its entrance is as follows:—

Conical white buoys mark the starboard side of the channel on entering, and conical red buoys or beacons the port side.

A white buoy, No. 9, marks the north-west horn of the 3-fathoms contour line of Great Kra flat, at about $1\frac{1}{2}$ miles south-south-westward of Pulo Rimau lighthouse. A similar buoy, No. 8, in same depth, marks the western edge of Great Kra flat, nearly abreast Batu Man.

A similar buoy, No. 7, in same depth, marks the western edge of the flat, westward of a bank which dries.

Charts 3732, 1366.

A similar buoy, No. 6, in about 4 fathoms, lies off the edge of the flat, at about 4 cables south-eastward of No. 5 red beacon, which carries a light situated 61° true, distant about $1\frac{1}{2}$ miles from the north-east extreme of Pulo Jerajah.

No. 4 white beacon carries a light; it marks the western edge of Great Kra flat, at $5\frac{1}{2}$ cables, 30° true, from No. 5 beacon light.

No. 3 red buoy lies half a mile north-west of No. 4 beacon, at south-east extreme of Syrang bank.

No. 2 white buoy marks the western edge of Great Kra flat, at $1\frac{1}{2}$ miles northward of No. 4 beacon.

No. 1 red buoy marks the edge of Middle bank, at $3\frac{1}{2}$ cables north-east of the point which dries.

A white conical buoy lies near the fairway of the channel between Middle bank and Pulo Penang, at half a mile southward of Swettenham pier.

Fishing nets, which often extend across the fairway, are marked by three stakes moored vertically, one over each end of the net, and one over the centre, showing about 2 feet above water, and appearing like ordinary fishing stakes; they may be avoided by passing between

General charts 1355, 830, 2760, 70.

Charts 3732, 1366. Var. $0\frac{3}{4}^{\circ}$ E.

the sets of three stakes. Vessels should also avoid the fishing stakes, which frequently extend a considerable distance from the shore into the fairway.

- 5 **DIRECTIONS.**—From the southward a vessel should not bring Pulo Kendi to bear westward of 350° true until Pulo Rimau light-house bears 40° true; course may then be altered for the latter, passing westward of No. 9 buoy, and at about 2 cables eastward of that island; thence the vessel will be guided by the buoys and beacons to
- 10 the anchorages off Georgetown.

Sailing vessels should not enter the South channel without a commanding breeze from the south or south-west, which breeze does not often blow except in August and September.

- At night** the pilots will take vessels in or out. (*See Pilots*, page 15 178.) Pulo Rimau light should be approached showing *white* and bearing about 40° true, until within about half a mile of it, when course should be shaped to pass about $1\frac{1}{2}$ cables eastward of it. Entrance is not recommended to strangers.

Plan of Penang harbour 3732.

- 20 **GEORGETOWN** (*Lat. $5^{\circ} 24' N.$, Long. $100^{\circ} 20' E.$*), the capital, is situated at the north-east extremity of Pulo Penang, with a population in 1911, inclusive of Province Wellesley and the Dindings, of 171,601 males and 106,402 females. The majority are Chinese, while the Malays chiefly occupy the country districts.

- 25 It is built on level ground, and is clean and well supplied with water by iron pipes from two mountain streams. It has a handsome church, Roman Catholic chapels, a court-house, the Government offices, gaol, public school, poorhouse, and the civil and military hospitals.

Butterworth is situated on the mainland, abreast Fort Cornwallis.

- 30 **Fort Cornwallis** is situated on the north-east point of the island.

- LANDINGS.**—No person in charge of any launch, boat, or sampan, shall land any passenger or other person between the following limits: A line from Tanjong Tokong Police Station to the harbour
- 35 mark at Telok Remis in Province Wellesley, and a line from the southern harbour mark on Penang island to the southern harbour mark on Province Wellesley shore, except at the following places:—

- Penang island.**—The cattle ramp near Fort Cornwallis, and the beach for a distance of 150 feet on each side of it; the Fort jetty;
- 40 Swettenham pier; Victoria jetty, Church Street wharf; Acheen Street Ghaut; and the Federated Malay States jetty.

Province Wellesley.—The Bagan Tuan Kechil pier and the beach for a distance of 150 feet on each side of it; the Straits Trad-

General charts 1366, 1355, 830, 2760.

Plan of Penang harbour, 3732. Var. 0 $\frac{3}{4}$ ° E.

ing Company's wharf, Butterworth; the Asiatic Petroleum Company's wharf at Butterworth; the new wharf at the Prai dock; the Prai dock pontoon; and the railway pontoon in Kwala Prai.

Articles 20-27 of the Port Regulations for Singapore, Appendix I., pages 472-474, apply to all the ports of the Straits Settlements. Complete lists of the Regulations are obtainable at the ports. 5

Swettenham pier, an iron pier, with a long T head, is situated about 2 cables south-eastward of Fort Cornwallis lighthouse; it is 1,200 feet in length, and vessels can go alongside at all times of day or night, there being a depth of 30 feet at low water, springs. 10

Vessels coming alongside the pier will do so at their own risk, and will be liable for any damage done to the pier or any government property; vessels shall use their own hawsers and shall be moored to the satisfaction of the wharf manager. 15

A full copy of the conditions will be handed to masters of vessels going alongside.

Victoria pier, Church Street pier, and Railway pier, southward of Swettenham pier, are all lighted. *See Lights*, on page 177.

Lloyd's signal station (*Lat. 5° 25' N., Long. 100° 17' E.*).— Lloyd's signal station is situated on Government hill, westward of the town, and 2,551 feet above high water. It is the property of and controlled by the Colonial government of the Straits Settlements. 20

Communication.—Most of the larger companies' steamers call at Penang; the Netherlands Royal Packet Company's steamers between Singapore and Padang call every fortnight; there is fortnightly communication by the same steamers with Batavia, also constant communication with the other parts of the Straits Settlements and with Sumatra. Specially-built steamers run from Penang in connection with the railway at Prye, which connects with the Perak system. Telegraphic communication with all parts and a telephone service; the telegraph office is always open. A wireless station is under construction at Penaga, on the eastern shore. (*See also Chapter I., page 4.*) 25 30

Submarine telegraph cables.—Two cables connect Penang with Singapore; single cables are laid to Colombo, Malacca, and Deli, and there are two cables to Madras, one being *via* Pulo Weh in Sumatra. A telephone cable crosses the harbour about half a mile northward of Fort Cornwallis, as before mentioned. 35

Coal and supplies.—About 28,000 tons of coal are usually kept in stock, and the annual importation is about 300,000 tons. From 500 to 600 tons can be put on board in 24 hours by several companies; coaling is carried on by bags. 40

Vessels coal at the Government piers which have depths of 16 to 32 feet alongside, at Swettenham pier, depth 30 feet, or in Kwala 45

General charts 1366, 1355, 2760, 830.

Plan of Penang harbour, 3732. Var. 0° 50' E.

Prye, where there is a depth of 24 feet alongside the wharves, but the entrance has less water. *See Kwala Prye, below.*

There are about 100 lighters belonging to the Government.

- 5 From 2,000 to 3,000 tons of liquid fuel are kept in stock by the Asiatic Petroleum Company; 500 tons can be pumped on board in 24 hours.

- 10 Fresh meat, vegetables, fruits, bread and other supplies may be obtained in large quantities; water is conveyed to the shipping in the anchorage tanks.

The island produces fine timber, which is well adapted for spars and shipbuilding.

- 15 **Docking accommodation.**—At the entrance to Kwala Prye, on the mainland, is a dry dock; also a patent slip for small craft. *See Appendix II., page 475.*

Repairs.—Large repairs to engines and boilers are undertaken at the Prye foundry, now called the Penang Harbour Board establishment; there are sheers which will lift 30 tons, small steam hammers, and a large number of lathes.

- 20 **Sick quarters.**—There is a good general hospital 3 miles from the town, and a quarantine station and leper hospital on Pulo Jerejak.

On the top of Penang hill, at an elevation of 2,500 feet, is a convalescent bungalow, distant 4 miles from the town.

- 25 **Trade.**—Penang is a free port. The exports comprise tin, sugar, spices, sago, rice, buffalo hides and horns, rattans, gum, coffee and opium. In 1911, the value of the exports, including the Dindings, amounted to £13,819,281, and the imports to £15,305,404.

- 30 The shipping returns are included with Straits Settlements; the aggregate tonnage which entered and cleared at Penang in 1912 amounted to 5,892,713 tons.

COAST.—Kwala Prye or Prai.—The Rivers Prye, Júru, Batukawan, and Tenga have their exit on the coast abreast Penang.

- 35 Kwala Prye (*Lat. 5° 22' N., Long. 100° 22' E.*) is situated on the mainland, 2½ miles south-westward of Georgetown, and eastward of the northern end of Great Kra flat. A mudflat, which dries, extends about 3 cables southward of the northern point of entrance and about 2 cables off the east point, covered with fishing stakes. The south point is embanked, and here are situated the workshops, &c., of the Government dock. The channel over the bar has a depth of 13 feet at low water. The wharves have a depth of 24 feet alongside, as before mentioned with coaling.

Landmark.—On the coast, at about one mile northward of the entrance to the river are the Straits Trading Company's smelting works with four conspicuous chimneys.

- 45 **Light-buoy.**—A red light-buoy, exhibiting a *white* light over a *green* light, has been established at the south-west extreme of

General charts 1366, 1355, 2760, 830.

Plan of Penang harbour, 3732. Var. 0° 50' E.

the mudbank on the north side of the entrance to Kwala Prye; these lights are 3 feet apart, and should be visible from a distance of one mile.

Buoys.—A white conical buoy, surmounted by a staff and ball, 5 marks the southern side of the entrance; it is moored at about one cable off the edge of the bank in a depth of $3\frac{3}{4}$ fathoms.

Two red mooring buoys lie on the eastern edge of the channel, off the smelting works, the northern one abreast the south end of the works, and the other at 2 cables distance to the southward of it, in 10 about 5 fathoms.

Communication.—The railway from Kwala Prye runs to Taipeng and thence, through Perak and Selangor, to Seremban and Singapore. See page 8.

Chart 1366, Penang harbour and approaches.

15

Kwala Juru discharges at about 3 miles southward of the Prye, its mouth being nearly dry at low water; within them are depths of about one fathom. The mudflats extend over a mile off the entrance.

Kwala Jajawi (Sungi Bukit Tambun) entrance has a depth of only one foot at low water over the bar, but within, the depths 20 are from one fathom to 3 fathoms. It joins Kwala Tenga on the east side of Batu Kawan island. The Admiralty charts will give the best idea of these streams.

The north side of the bar is marked by a white beacon, surmounted by a cage, and a red pole beacon, as charted.

25

Kra islands (Lat. $5^{\circ} 16' N.$, Long. $100^{\circ} 23' E.$) lie about one mile off the entrance of Kwala Jajawi. North Kra island is one mile in length and 337 feet high, and South Kra three-quarters of a mile in length and 356 feet high, with a passage having 3 feet water 30 between them. There is a channel, with not less than 5 fathoms water, leading from Georgetown within a mile of the Kra islands, and from 4 to 3 fathoms for some distance southward of the islands; here it becomes blocked by Great Kra flats.

Sungi Krian, 3 miles southward of the Tenga, is said to be navigable, for craft of about 4 feet draught, for a distance of 40 miles. 35 It is an important outlet both to the province of Wellesley and to Perak. There is a factory with chimney between the Krian and Tenga on the Byram estate, as charted, and there are other factories on the estates farther northward.

Krian bank lies close southward of South Kra island on the Great 40 Kra flat, and dries at low water.

General charts 1366, 1355, 2760, 830.

CHAPTER V.

MALACCA STRAIT, EASTERN OR MALAY SHORE.

(Continued.)

FROM PULO PENANG TO TANJONG BULUS, THE NORTH POINT OF
THE ENTRANCE TO SINGAPORE STRAIT.

VARIATION IN 1915.—Decreasing about 4 minutes annually.

Chart 793, Butang group to Pulo Berhala.

PERAK.—The shore limit of the boundary (*Lat. 5° 7' N., Long. 100° 25' E.*) between Province Wellesley and the State of Perak is situated about 2 miles southward of Kwala Krian, thence in a direct
5 line to Parit Buntar on that river. See description of the State, pages 10, 11.

Coast.—The coast from Kwala Krian takes a south-south-west direction for $5\frac{1}{2}$ miles to Tanjong Piandang, thence south-eastward for $13\frac{1}{2}$ miles to Tanjong Pasir, in Selensing bay, beyond which at a
10 further distance of 6 miles is Kwala Lárut. This coast forms several bights, is low and thickly wooded, and fronted by flats, with depths of less than 3 fathoms in places, to the distance of 10 miles, the continuation southward of the Great Kra flat.

Fishing stakes.—On the flats, between Penang and Kwala
15 Lárut, there are numerous fishing stakes situated several miles off-shore, but generally within the 3-fathoms contour line.

The Kwala Kurau and Sungi Kota enter the sea between Tanjong Piandang and Tanjong Pasir; the former is a considerable stream, but its bar is extending, its north bank advancing seaward
20 and the entrance becoming narrower and more shallow, apparently less than 3 feet at low water in the approach.

SELENSING BAY.—**Sungi Sengar (Singa) Besar.**—Selensing bay forms the approach to Sungi Sengar Besar, on which is Port Weld. Selensing channel and its continuation is entered from
25 the north side of the bay, and also leads to Port Weld, but by a very circuitous route.

The bay is blocked by the shore flats, the continuation southward of the Kra flats; it forms a bar 2 miles wide with a low-water depth of about 3 feet, over a bottom of mud, sand, and shells, comparatively
30 hard, in the approach to both these streams.

General charts 1355, 2760.

Chart 793, Butang group to Pulo Berhala. Var. $0\frac{3}{4}^{\circ}$ E.

Beacons.—Two beacons mark the south side of the fairway channel to the river.

Tanjong Pasir (*Lat. $4^{\circ} 53' N.$, Long. $100^{\circ} 32' E.$*), the northern point of the bay, may be recognised by the sandy beaches on the north and south sides of it, the only sand in the neighbourhood; there is also a fishing village on the point. The coast southward to Tanjong Krang is mangrove jungle, covered for some distance inland at high water spring tides.

Directions.—Approaching Port Weld by Sungai Sengar Besar, cross the bar, which has about 3 feet at low water and 11 feet at high water spring tides, by passing just northward of the two bar beacons; no difficulty will be found in navigating a small craft to Sapetang island, situated half a mile below Port Weld, the depths to which, within the bar, are not less than 12 feet at low water.

Sapetang island is nearly connected at low water to the shore westward of it; the channel therefore is northward of that island, when Port Weld will be seen; from this to Port Weld the depth over the bank that bars the river is from 2 to 4 feet at low water, but it was intended to dredge a channel through this bank; from thence the depth is about 12 feet to Port Weld. The depths in the river off the wharf are from 3 to 4 fathoms.

Tides.—It is high water, full and change, in Selensing bay at 1h. 58m.; springs rise 8 feet, neaps 6 feet.

Tidal streams.—At 2 miles off Tanjong Krang the flood runs south-east and the ebb north-westward at the rate of $1\frac{1}{2}$ miles an hour; probably turning as at Penang. See page 178.

PORT WELD or Sapetang (*Lat. $4^{\circ} 50' N.$, Long. $100^{\circ} 38' E.$*) is distant 5 miles above the entrance to Sungai Sengar Besar, at the junction of that river with Kwala Sapetang, leading northward from Kwala Lárut; a somewhat longer route from the sea, described on page 190.

Port Weld is the port of Taipeng (Taiping), the capital, distant about 8 miles, to which it is connected by rail and a good road. The wharf at Port Weld has a depth of about 10 feet alongside at low water. There is a road from Port Weld to Kwala Kangsa, distant 22 miles, the seat of the Resident of Perak.

Communication.—There is telegraphic communication between Port Weld and Penang.

Trade.—The principal export is tin; the imports are rice and other necessities for the miners, who are principally Chinese.

General charts 1355, 2760.

Chart 793, Butang group to Pulo Berhala.

Tides.—It is high water, full and change, at Port Weld, at 11h. (two) 28m.; springs rise 8 feet, neaps 6 feet.

KWALA LÁRUT, the entrance to which lies about 4 miles southward of Sungai Sengar Besar, is nearly 2 miles wide between Tanjong Krang and Tanjong Burong, but much narrowed by mudflats extending from its shores, dry at low water. A bar, about $2\frac{1}{2}$ miles broad, with a depth of 4 feet at low water spring tides, fronts the entrance, inside which the water deepens to about 2 fathoms.

Lights (*Lat.* $4^{\circ} 48' N.$, *Long.* $100^{\circ} 33' E.$).—A light is exhibited from a white mast on Tanjong Krang, north side of Kwala Lárut. See Light list.

Beacon lights.—A light is exhibited from a beacon, No. 3, marking the south side of the fairway to the river, situated $1\frac{1}{8}$ miles, 160° true, from Tanjong Krang; also a light is exhibited from another beacon on the south side of the channel, about 4 miles up, at the junction of the Lárut and Sapetang.

Beacons.—Two beacons mark the bar fairway, about one mile apart, seaward of the beacon fairway light; beacons, surmounted by discs, mark the edges of the banks on both sides of Kwala Lárut as far up as Trusan Siamang, just below the police station. The discs on these beacons are painted black on one side and white on the other, those on the south side of channel being black to seaward and white inshore; the northern beacons are the reverse. The black side of the discs must be always kept on the starboard hand, and white side of discs on the port hand, both on entering and leaving the river.

Telok Kertang, about 7 miles above the entrance of Kwala Lárut is the port of Lárut and has a wharf and Custom-house; the shallowest spot in the river is abreast Trusan Siamang, just below the police station, where the depth is only 4 feet, but abreast the town it is 120 yards wide, with a depth of about 12 feet. A road connects Telok Kertang with Taipeng.

Kwala Sapetang, 4 miles within Tanjong Krang, leads to Port Weld; its entrance has a short bar with 6 feet at low water, spring tides.

Pilots for Kwala Lárut should be obtained at Penang.

Directions.—The following remarks may be useful:—

Small craft should approach Kwala Lárut with Tanjong Krang lighthouse bearing 90° true, until the outer beacons are seen, then they should be steered for, passing from one cable to 2 cables on either side in a depth of about 12 feet at high water, spring tides; pass northward of No. 3 beacon (showing the black side of a disc, and a red light

General charts 1355, 2760.

Chart 793, Butang group to Pulo Berhala.

at night), the other beacons will then be seen, which mark both sides of the channel, as above described.

If bound to Telok Kertang, when abreast the beacon (with *red* light at night), off the entrance to Kwala Sapetang, steer across to the south shore, between the beacons, to avoid the bank extending nearly across the channel from the north shore, crossing the bar off Trusan Siamang, with 12 feet at high water, spring tides, and keeping the south shore until abreast of the police station. Thence the river is narrow and tortuous, but deeper; the concave side should be kept as far as the last point before reaching Telok Kertang, when haul over for it as soon as the town opens, to avoid a spit off the creek on the north shore.

Proceeding to Port Weld haul into Kwala Sapetang when that channel is well open, the entrance to which has 14 feet on the bar at high water, spring tides, thence deepening to Port Weld; when within the bar keep the concave side of the channel.

Sungi Limau is separated from Sungi Lárut by a mudbank, 3 miles in length, extending seaward from Trusan Siamang, which dries in patches; the water deepens inside Kwala Lárut bar, the common entrance, to about 2 fathoms, the channel being marked by fishing stakes.

TAIPENG (Taiping) (*Lat. 4° 51' N., Long. 100° 45' E.*), situated at the foot of the Gunong Tupei range, and 8 miles eastward from Port Weld, is the seat of Government of the State of Perak, and also its largest and principal town; the houses are built of brick, laid out in squares, with streets 70 feet wide. The principal buildings are the court-house, police barracks, a reading-room, and an hotel under European management. Water is led from the mountains and through the town by pipes.

The assistant Resident is stationed here, and his house stands on a hill overlooking the town and mines.

Communication.—A railway connects Taipeng with Port Weld and with Butterworth in Province Wellesley, also with Malacca and Singapore, and there is telegraphic communication with all parts.

Trade.—The chief product is tin from the mines in the district, principally worked by the Chinese. Gold is found in some parts, but not in sufficient quantity to pay for working.

The exports consist of tin, attaps, firewood, sugar, rattans, timber, fruit, and salt fish; the imports are specie, rice, opium, live stock, oil, piece goods, and provisions.

Mountains.—Eastward and south-eastward of Taipeng, and about 15 miles from the coast mountains rise from the plains, the

General charts 1355, 2760.

Chart 793, Butang group to Pulo Berhala.

principal being Gunong Tupei and, 10 miles southward of it, Gunong Bubu, 5,484 feet high. Gunong Hijau, about a mile eastward of

5. Gunong Tupei, and 4,678 feet high, is seen over the latter. Gunong Pondok, a sugarloaf-shaped limestone mountain, 1,800 feet high, and $2\frac{1}{2}$ miles southward of Gunong Tupei, appears in the pass between Tupei and Bubu ranges; it is seen only when off Kwala Lárut. Except in the rainy season, from about June to November, the summits are seldom visible.

- 10 **COAST.**—Between Kwala Lárut and the Dinding islands the three principal streams are the Kwala Trong, Kwala Jarum Mas, and Sungai Bruas, fronted by the mudbank extending from 5 to 9 miles off-shore. The Trong and Bruas are navigable by canoes for nearly 60 miles, the Jarum Mas is merely a tidal estuary.

- 15 **Boundary.**—The boundary between Perak and Dindings territory is near the south point of entrance of Kwala Jarum Mas, thence in a direct line to the boundary stone on Gunong Sunting Balok.

- False Dinding** (*Lat. $4^{\circ} 23' N.$, Long. $100^{\circ} 36' E.$*) is formed by the two highest peaks of a short range of hills near the coast about 20 9 miles northward of Pulo Pangkor or Great Dinding, and by a vessel approaching from the northward are seen before Pulo Pangkor, which they much resemble.

- Pulo Talang** is a small islet lying a quarter of a mile from the coast northward of False Dinding. About 2 miles westward of Pulo 25 Talang is the north extreme of Dinding north bank, a narrow bank, with depths of from one to 3 fathoms, which extends 8 miles southward, to Pulo Pangkor, with a channel with about 3 fathoms least water between it and the shore.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ} E.$

- 30 **TANJONG HANTU**, the north point of the north entrance to Dinding channel, about 3 miles northward of Pulo Pangkor, is a sloping point, the summit of which is 757 feet in height.

- LIGHT** (*Lat. $4^{\circ} 19' S.$, Long. $100^{\circ} 33' E.$*).—A light is shown, at a height of 180 feet above high water, on the extreme of Tanjong 35 Hantu, from a grey brick tower 20 feet in height. See Light list.

- Coast.**—The coast from Tanjong Hantu to Motts point, the north entrance point of Dinding river, is skirted by a shallow bank, having depths of from 3 feet to 2 fathoms, and extending a distance of from 6 to 8 cables; it gradually diminishes its distance from the shore southward of Mudge bluff as Motts point, at the entrance to Dinding river, 40 is approached.

Grant bluff, or Tanjong Labuan Bili, and Mudge bluff, both of which are high, forming the west extremes of ranges of hills, divide

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

the coast into three shallow bays with sandy shores; the northern bay is Labuan Bili Besar, the centre Telok Senangin, and the southern Telok Kopea. There are numerous fishing stakes on the banks.

PULO PANGKOR, or **Great Dinding island**, is 5 miles in length in a north and south direction, 2 miles in breadth, and separated from the mainland by Dinding channel, about a mile wide, but narrowed by banks to about 3 cables; this channel affords secure anchorage for all classes of vessels.

The island is mountainous and densely wooded, the highest part, situated about 2 miles from the north point, being 1,318 feet in height. On the north and south extremes are two hills, respectively 748 and 992 feet high. Two mountain tops rise near the centre of the island, and attain heights of 1,241 and 1,166 feet. *See view a on page 205.*

Pulo Pangkor and the adjacent coast, commencing at Pulo Katak and extending 22 miles in a northerly direction, is British territory and a dependency of Penang. *See page 7.*

WEST COAST.—The west coast of Great Dinding is deeply indented, forming Telok Blangah and Telok Nipah, or West anchorage; southward of Turtle point, between it and Fly point, the south-west extreme of the island, $1\frac{3}{4}$ miles apart, is Passir Bogar, protected by Pulo Pangkor Kechil (Laut).

Telok Blangah, the northern bay, affords anchorage in its centre in depths of $3\frac{1}{4}$ fathoms, shoaling gradually to the shore, and is free from danger.

Telok Nipah, or West anchorage, lies between Reed bluff and Long island, with Rat island, 135 feet high, near the shore and midway between the points mentioned. Fair anchorage may be obtained in 4 fathoms, sand bottom, 2 cables northward of Long island, between it and Rat island. It is sheltered from all winds except those from W.S.W. to North.

Pulo Pangkor Kechil (Laut), or Little Dinding island, lies three-quarters of a mile off the south-west side of Pulo Pangkor; it is nearly one mile in length, and from 5 to 6 cables in breadth. The south-eastern hill of the ridge which traverses the island is 480 feet, and the northern one 446 feet in height.

Its northern and eastern sides are fringed with reef and rocks above water to a short distance, but its south and west sides are fairly clear, with deep water close in.

Outer islets, 135 and 140 feet high, lie off its south-west extreme. A sandbank, with a least depth of 2 fathoms, lies from 2 to 4 cables distant from its south-east extreme, off which is a rock 12 feet high. North-west of the sandbank, between it and the shore, is a group of rocks, 6 feet high.

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

Anchorage.—The bay between Great and Little Dinding islands affords good anchorage in any required depths. Small craft anchor in about 4 fathoms, as charted. Passir Bogar, the northern light, has 5 depths under 2 fathoms, with a sandy beach fronting the village.

Inner islets, 26 and 140 feet high, lie off Turtle point in the northern entrance to the anchorage.

Tidal streams.—The flood runs southward, and the ebb northward along the west coast of Pulo Pangkor, taking the direction of the 10 shores between Great and Little Dinding islands.

The south coast of Pulo Pangkor, between Fly point and South-east point, entrance to South channel, is steep-to. The east and north coasts of the island are described with Dinding channel.

FAIRWAY ROCK (*Lat. $4^{\circ} 8' N.$, Long. $100^{\circ} 33' E.$*), 27 feet 15 high, lies 197° true, distant 4 miles from the hill over South-east point, the west side of the south entrance of Dinding channel. A sunken rock lies at the distance of half a cable northward of it, otherwise it is steep-to, with depths of 18 fathoms at a short distance. The depths gradually shoal towards Pulo Pangkor.

DINDING CHANNEL.—Depths.—The northern entrance 20 is barred, with a depth of 4 fathoms at low water, springs, and is not recommended for vessels above 18 feet draught; the southern entrance is deep, and available for all vessels, to Pangkor. Vessels of 18 feet draught can proceed at all times to Lumut, in Dinding river, the seat 25 of Government. The least depth over the bar of River passage is about 22 feet at low water.

North entrance.—Islets and dangers.—North bank having depths of from 3 to 15 feet, over mud and sand, with one patch dry at low water, lies in the north entrance of Dinding channel, and, 30 with the shallow bank which skirts the mainland adjacent, much encumbers the north entrance of the channel. Its southern extreme lies half a mile north-eastward from Scorpion point, Pulo Pangkor, and its north extreme nearly abreast Pulo Talang, 10 miles to the northward; between it and the coast is a narrow channel leading into 35 Dinding channel, with depths not under 3 fathoms, but there are no marks for it.

Wedge rock, 3 feet high, lies on the west edge of North bank, distant $1\frac{1}{10}$ miles south-westward from Tanjong Hantu lighthouse.

An outlying patch, with a depth of 3 fathoms, is situated 257° true, 40 distant 7 cables from Wedge rock.

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

Buoy.—The southern prong of North bank is marked on its western side by a white conical buoy; the position of this buoy should not be depended on.

North-west islet, or Pulo Trendah, 100 feet high, is small, thickly wooded, and lies 5 cables distant from the north-west point of Pulo Pangkor; at three-quarters of a cable distant from its west side there is a rock with a depth of 3 feet. Pulo Pelanduk, a small islet, 7 feet high, lies nearly midway between North-west islet and Pulo Pangkor. 5 10

North point.—The coast of Pulo Pangkor, between North-west point and North point, is bordered by a shallow flat, on which, about midway between the points, is situated Grasshopper islet or Pulo Plando, 121 feet high, and wooded.

Off-lying rock, 2 feet high, and half a cable in extent, lies 2 cables, 90° true, from North point, with depths of from 5 to 8 fathoms between. 15

Telok Dalam, lying westward of Scorpion point, is shallow, having depths of 6 to 9 feet only on a line joining the entrance points; at its head there is a fishing village and a cocoanut grove. A spit extends about 2 cables north-eastward and eastward of Scorpion point. 20

Charybdis rock, a pinnacle having a depth of 2 feet, lies $1\frac{1}{4}$ cables northward from Scorpion point; the ground is foul between.

Bower patch, with a depth of $2\frac{1}{2}$ fathoms, is about half a cable in diameter, and lies on the south side of the fairway of North entrance channel, 348° true, distant 3 cables from Scorpion point. The summit of North-west islet, midway between North point and Off-lying rock, bearing 292° true, leads northward of Bower patch in 4 fathoms least water. 25

Table rock, 22 feet high, is situated one mile south-eastward of Scorpion point, and about one cable from the south point of Telok Chumpada, a shallow bight. 30

PORT PANGKOR (*Lat. $4^{\circ} 13' N.$, Long. $100^{\circ} 34' E.$*).—The settlement at Pangkor, on the east side of the island, consists of a police station and a few houses scattered on the beach; the ground in the vicinity is swampy and unhealthy. 35

The police-station is at Hospital point, where there is a small pier.

Small vessels may be readily and safely grounded for examination or slight repairs between tides.

Light.—A light is shown from a beacon standing on Hospital rock, southward of Pangkor settlement. See Light list. 40

Communication.—Most of the local steam craft which run between Penang and Perak river call at Port Pangkor, as do also

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

some of those running between Penang and Singapore; there is thus almost daily communication with Penang.

Supplies.—Poultry, eggs, fruit, and pigs occasionally, may be
5 procured at most of the native villages at reasonable prices; fish are obtainable and may be taken with the seine in the bays, and turtle may be caught in the season. Firewood is procurable.

Anchorage.—Abreast of Pangkor village there is secure anchorage for vessels of deep draught, and sufficient space for several
10 vessels to moor. A good berth is in 9 fathoms, mud bottom, with the mouth of Sungai Penang bearing about 270° true, distant $2\frac{1}{2}$ cables, and the same distance from the edge of East bank.

Bathing is unsafe on account of alligators.

Port regulations.—Small craft under oars or sail, of less than
15 20 tons gross tonnage, and boats under sail, duly licensed, shall, when within port limits between sunset and sunrise, cause to be exhibited, either the lights prescribed by the Regulations for preventing collisions at sea, or shall have ready at hand a lantern showing a bright white light, which shall be exhibited on the approach of or when approaching
20 other vessels in sufficient time to prevent collision.

Every vessel within the limits of the port shall anchor while discharging passengers or cargo.

No vessel shall anchor in such a manner as to obstruct the fairway of any river or channel within port limits.

25 'All small craft navigating the Dinding river or Dinding channel shall keep out of the way of steamers.

Free passages shall be kept to all piers, jetties, wharves, landing places, and all vessels and rafts shall move without delay when so directed by the Port officer or any Police officer. Other rules as for
30 Singapore; Articles 20 to 27, Appendix I., pages 472-474.

Coast.—**Raja Bayan village** to the southward of Hospital point, and the village in Telok Godown, between Tomb point and the south-east extreme of the island, are inhabited by native fishermen and their families. Rocks front the shore in places, as charted.

35 **DINDING RIVER** (*Lat. $4^{\circ} 15' S$, Long. $100^{\circ} 35' E$*), abreast Scorpion point of Pulo Pangkor, has a deep and clear entrance, excepting Lloyd rock; and between Mehegan and Motts points it is 8 cables wide. The bar of River passage between North and East banks has a depth of about 22 feet at low water in its fairway, thence a channel
40 2 cables wide, and having from 5 to 7 fathoms, extends 3 miles up the river, the farthest point reached by the surveying parties. It takes its rise apparently near False Dinding hills, some 8 miles northward of Lumut, and is fed by several streams. Yellow cliff, 14 feet, and Red

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

cliff, 26 feet above high water, both on the south bank of the river, below the settlement, are conspicuous.

Motts point (*Lat. $4^{\circ} 15' N.$, Long. $100^{\circ} 35' E.$*), the northern entrance to Dinding river rises to a height of 357 feet at 3 cables 5 within it. A narrow sandbank which dries at low water extends about a mile north-west of it, within the 3-fathoms contour line, and fronts Telok Kopea.

Lloyd rock, a pinnacle, awash at low water, spring tides, with 6 to 8 fathoms around it, lies 4 cables 270° true from the point. 10

Mehegan point, the south point of the entrance, is the north-west extreme of a coast ridge of hills, and is 309 feet high. River rocks, 12 feet high, lie $1\frac{1}{2}$ cables westward of it, within the 3-fathoms contour encircling the point.

Lumut, or Tanah Merah, situated on the south bank of the river, 15 at about 2 miles above its entrance, is the head-quarters of the administration. Here are the treasury, court-house, public offices, police barracks, and hospital.

The bights westward of the settlement are fronted by a shallow bank, with depths under 3 fathoms to the distance of a quarter of a 20 mile in places with rocks above and below water, as charted.

Pier.—Light.—There is a small wooden pier, with a depth of 5 feet alongside at low water, spring tides. A light is exhibited from the pier end, visible about 2 miles. *See Light list.*

Supplies.—Communication.—There is almost daily com- 25 munication with Penang by steamers calling at Port Pangkor (page 195). Poultry, eggs, fish, and vegetables are procurable in small quantities.

Anchorage may be obtained off the settlement, in depths of from 6 to 7 fathoms, and there is not less than $3\frac{3}{4}$ fathoms at low 30 water in its approach.

Prohibited anchorage.—No vessel shall anchor within 200 feet westward of a line drawn 349° true from the centre of Lumut pier to the opposite side of the river.

COAST.—The coast southward of Mehegan point, south side of 35 entrance to Dinding river trends southward for a distance of about $5\frac{1}{2}$ miles to Tanjong Katak, east side of approach to Dinding channel from the southward. It is very irregular, and the whole of it is fronted by an extensive mudflat known as East bank, described later. Telok Moro, about $1\frac{1}{2}$ miles wide, is nearly all dry at low water. The 40 Bremner rocks 5 feet high, lie off Pasir Tanjang, its north extreme.

Adams bluff and Symonds point, at $3\frac{1}{4}$ and 5 miles respectively, southward of Mehegan point are prominent.

General charts 1355, 1009, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

- PULO KATAK**, a small wooded islet, 77 feet high, stands on the edge of the bank at 4 cables westward of Tanjong Katak, on the east side of the southern entrance to Dinding channel; sunken rocks lie
5 between the island and Symonds point.

LIGHT (*Lat. $4^{\circ} 9' N.$, Long. $100^{\circ} 37' E.$*).—A light is exhibited, at an elevation of 107 feet above high water, from a white concrete tower, 38 feet high, erected on Pulo Katak. *See Light list.*

- Boundary.**—At Pulo Katak is the southern boundary between
10 Dindings territory and Perak State; thence 34° true for about 5 miles.

- SOUTH ENTRANCE.—Depths.**—The southern entrance to Dinding channel, to Pangkor, the settlement on the east side of the island, is deep throughout, not less than 9 fathoms up to the anchorage, and is the only channel available for vessels of deep
15 draught. Its entrance, abreast South-east point, and the channel between Pulo Pangkor and East bank, fronting the eastern shore is about half a mile wide.

- East bank**, which trends parallel to, and fronts, the coast of the mainland, northward of Symonds point, occupies half the breadth of
20 Dinding channel. From abreast Pangkor, to its north extreme, where there is a light-beacon, it is reduced to a breadth of about 2 cables, with a blind channel eastward of it.

- At about half a mile within the northern extreme is the northern end of a very narrow ridge, $1\frac{3}{4}$ miles in length, awash in places at low
25 water, and extending southward to abreast Hospital rock.

There are numerous fishing stakes on East bank. Pulo Katak light is obscured over East bank.

- Light** (*Lat. $4^{\circ} 15\frac{1}{4}' N.$, Long. $100^{\circ} 34\frac{1}{4}' E.$*).—At the north extreme of East bank and 22° true, distant 8 cables, from Table rock,
30 a light is exhibited from a screw pile beacon. *See Light list.*

- DIRECTIONS. — North entrance.** — The northern entrance is not recommended for vessels of more than 18 feet draught, for although there is not less than 4 fathoms water, yet the passage is narrow, being only about one cable wide with that depth, and
35 2 cables wide with depths above 3 fathoms. When the sun is in a favourable position for showing up the shoals the eye is the surest guide, and due attention should be paid to the speed of the vessel and to the set of the tidal stream.

- Approaching the northern entrance, the north peak of Pulo Pang-
40 kor should not be brought to bear southward of 148° true, which leads well to the westward of North bank. North-west islet will be sighted nearly ahead on this bearing, and passing it on the starboard hand at about 2 cables distant, steer to pass half a cable northward of Off-lying

General charts 1355, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

rock, then bring the summit of North-west islet midway between Off-lying rock and North point bearing 292° true. This mark astern will lead over the bar in 4 fathoms at low water, one cable northward of Bower patch, and southward of North bank. 5

If bound to the anchorage off Pangkor, when Scorpion point bears 226° true, or being nearly abreast of the white buoy at the south-east end of North bank, alter course to pass about $1\frac{1}{2}$ cables eastward of Table rock, and thence, preserving the same distance from the island, to the anchorage. (See page 194.) 10

If bound to Dinding river, from a position with Scorpion point bearing 226° true, sheer a little to the southward, to give the buoy at the south-east extreme of North bank a wider berth, then bring the back leading mark on again, before the north end of East bank is approached, passing northward of the light beacon. 15

There is also a channel eastward of North bank; it may be approached by steering in for Tanjong Hantu lighthouse bearing 108° true, which leads across North bank in about 15 feet at low water, until 3 cables from it, thence with the outer hill on Mehegan point bearing 149° true which should be steered for until Mudge bluff bears 63° true; from thence the light-structure on the north end of East bank bearing 166° true should be steered for until Scorpion point bears 253° true, whence course may be shaped for the fairway of the river southward of Lloyd rock. This channel is suitable for vessels of 10 feet draught, but should not be taken without local knowledge. 20 25

South entrance.—From the southward, when between Fairway rock and Pulo Katak, steer to bring Tanjong Hantu open eastward of Table rock, bearing 347° true, which mark will lead in mid-channel to the anchorage off Port Pangkor. See view on chart.

If wishing to enter Dinding river, continue on from the anchorage passing Table rock 2 cables distant, and thence midway between East bank and the island, until the North summit of Pulo Pangkor bears 231° true, which leads over the bar at about a cable northward of the light-structure on East bank, in $3\frac{3}{4}$ fathoms at low water; keep that mark astern until the summit of North-west islet is between North point and Off-lying islet, 292° true, which mark astern will lead through the entrance of the river well southward of Lloyd rock; thence in mid-channel to the anchorage off the settlement of Lumut. 30 35

Tides.—It is high water, full and change, in Dinding channel, at IIIh. 15m.; springs rise 9 feet, neaps 5 feet. 40

Tidal streams.—The flood, or south-going, stream sets fairly through the channel at rates of from 2 to 3 knots at springs. In Dinding river both the flood and ebb set at the rate of $3\frac{1}{2}$ knots at springs, and 2 knots at neaps.

General charts 1355, 1009, 2760.

Chart 792, Dinding islands and channel. Var. $0\frac{3}{4}^{\circ}$ E.

South-westward of Pulo Pangkor the flood sets south-eastward, and the ebb north-westward, and through the narrow passage between Pulo Pangkor Kechil and Pulo Pangkor at the rate of 2 to $3\frac{1}{2}$ knots at springs.

COAST.—From Tanjong Katak (*Lat. $4^{\circ} 9' N.$, Long. $100^{\circ} 37' E.$*) the coast is low, covered with jungle, and forms a bight, in which are several villages, and continues to the entrance of Kwala Perak, situated about 14 miles south-eastward of Pulo Pangkor. Between
10 Tanjong Katak and Tanjong Kapak, 7 miles south-eastward, there is a sandy beach fronted by mangroves. The bight is skirted by a mud-bank, which, extending from 2 to 5 miles off the coast, nearly blocks up the entrance of Perak river.

Chart 1009, Approaches to Perak river.

15 **KWALA PERAK** (*Lat. $4^{\circ} 1' N.$, Long. $100^{\circ} 43' E.$*).—**General remarks.**—**Depths.**—Kwala Perak rises in Siamese territory, near the northern boundary of Perak, and trends southward with many tortuous windings past Kwala Kangsa, and other towns for about 100 miles to Durian Sabatang, from whence it takes
20 a westerly direction to Malacca strait; the banks of the river are mostly low and covered with jungle.

There is a low-water depth of about 10 feet on the bar, with much deeper water within; the river is navigable for vessels of 11 feet draught as far as Telok Anson, about 30 miles from the entrance, and
25 about 5 miles below Durian Sabatang by the river, and three-quarters of a mile by the road. Vessels of the draught mentioned can reach Durian Sabatang, but the channel is difficult. Steam launches can proceed to Kota Lamut, about 5 miles beyond.

Its chief importance arises from the tin mines of Lower Perak and
30 Kinta.

Entrance points.—**Bar.**—Tanjong Bri Besar, the south point of the approach, is fronted by sandbanks partly dry at low water to a distance of 3 miles in a north-westerly direction, between which and Tanjong Kapak on the eastern side of the approach are
35 several detached banks as charted; these break heavily at times during the south-west monsoon period. The navigable channel is eastward of these banks, with a depth of 10 feet over the bar at low water, as before mentioned.

Tanjong Kupong, the north point of the river entrance, is shallow
40 to the distance of about 2 cables.

Lights.—**Denison beacon.**—From Denison screw pile beacon, on the east side of the eastern and best channel of Perak river, a light is exhibited. See Light list.

General charts 793, 1355.

Chart 1009, Approaches to Perak river. Var. $0\frac{3}{4}^{\circ}$ E.

It is situated on the west edge of the bank fronting the shore in a depth of one fathom, $2\frac{4}{10}$ miles, 160° true, from Tanjong Kapak.

Bagan Datoh.—Within the entrance on the south side, abreast Tanjong Kupong, is Bagan Datoh light, exhibited from a screw pile beacon. See Light list. 5

Channel.—The entrance channel, with about 19 feet at high water springs, and 15 feet at neaps, lies near the eastern shore, at about $1\frac{1}{2}$ miles southward of Tanjong Kapak and about the same distance off the shore of the bight. 10

Caution.—As the flats may be liable to shift caution is necessary when entering; also to avoid the numerous fishing stakes erected on the banks.

Directions.—Approaching from the northward, having passed Pulo Katak lighthouse, steer to bring the south-west point of Pulo Pangkor nearly touching the north point of Pulo Pangkor Kechil bearing about 304° true, which mark astern will lead northward of the outer fishing stakes, in 10 feet least water. This is a long and uncertain mark; Pulo Katak, bearing 307° true astern, until Denison beacon bears 117° true, is a much better mark, and with deeper water, according to the chart. 15 20

Coming from the southward, Pulo Nipis, the western island of the northern group of Sembilan islands, 262 feet high, should be open northward of Pulo Agas, the eastern island of that group, before either of the above marks are brought on, astern. 25

Denison pile beacon should be steered for as above until within 2 cables of it, thence with Bagan Datoh pile beacon bearing 162° true, which will lead over the bar; fishing stakes border both sides.

Approaching Tanjong Kupong, edge a little to the eastward to give the bank off it a wider berth; and when the entrance is well open alter course up the river, keeping about 2 cables from the south shore until past the long shoal, with about 4 feet least water, lying nearly in mid-channel, when cross over and keep the concave bank of the river to Kota Satia. The first reach in the river is the shallowest (about 10 feet at low water) between the entrance and Telok Anson, a distance of about 30 miles. There is a narrow channel northward of the mid-channel shoal, but it is not usually taken by local traders. 30 35

Kota Satia.—Anchorage (*Lat. $4^{\circ} 2' N.$, Long. $100^{\circ} 51' E.$*).—There is anchorage off Kota Satia, in a depth of about 3 fathoms, over mud, at about 2 cables from the shore, but a bank, with a depth 40

General charts 793, 1355, 794.

Chart 1009, Approaches to Perak river. Var. $0\frac{3}{4}^{\circ}$ E.

of one fathom, lies in mid-channel off Kota Satia, with a red tiled house bearing about 130° true.

Above Kota Satia.—As is usual in most rivers, deep water will
5 be found in the bights or concave sides and shoaler water off the points, and this rule should here be followed, remembering that the positions of banks in the river are liable to alteration by the freshets.

Leaving Kota Satia, keep close to that shore until southward of the mid-channel patch, then cross to the concave bank of the river; from
10 abreast the first point steer about mid-channel.

Berembang Panjang village is on the south bank, 4 miles above Kota Satia and Telok Bhara village, and anchorage is on the north bank at about 8 miles above Kota Satia.

Inset on same scale on chart 1009.

15 Depths of 6 to 11 fathoms will be obtained in the channel between Kota Satia and Batu Rabbit.

Single-tree point, nearly a mile below Batu Rabbit and distinguished by a white board fastened to a tree, should be given a good berth, and after rounding it steer in for Batu Rabbit, which will then be in sight
20 in the bend on the left bank, but keeping the left bank on board until Tanjong Rembia, the first point above Batu Rabbit, is neared, then sheer over to the right bank until the point is rounded.

Return again to the left bank and keep it close on board until abreast the cocoanut grove on that bank in the next bend, just below
25 Telok Menintam, then steer across to the opposite bank for the white board on a tree, on reaching which steer across to a similar board on the left bank, and keeping that bank to the end of that (Long) reach, where is the settlement.

Telok Anson (*Lat. $4^{\circ} 3' N.$, Long. $100^{\circ} 59' E.$*), the settlement,
30 is on the left bank of the river, at three-quarters of a mile by a good road from Durian Sabatang, and 30 miles from the entrance to the river. It consists of numerous wooden houses with tiled roofs, a Custom-house, and police barracks; the magistrate of the district resides here. Trade is carried on by Chinese, who supply the tin miners
35 in the interior. Tin is the principal export, and is brought from the mines situated 60 miles up the Sungai Bidor, and 6 miles from its banks. This river enters the Perak at Durian Sabatang.

Communication.—There is frequent communication with Singapore, and twice every week with Penang by coasting steamers; a
40 railway runs to Tapah road, a distance of 17 miles, joining the main railway system of Perak, and there is telegraphic communication to all parts.

General charts 1355, 793, 794.

Inset on same scale on chart 1009.

Supplies may be obtained from Penang on short notice, and good water from the Government waterworks.

Anchorage may be obtained close off Telok Anson settlement, in depths of 6 to 7 fathoms, but a shoal extends from the opposite point nearly half-way across the river. 5

Vessels do not usually proceed beyond this anchorage.

Chart 1355, Malacca strait.

Durian Sabatang.—(These directions are old, and the river is only navigable by those acquainted with it.) Beyond Telok Anson the channel to Durian Sabatang (4 miles above by river, but about three-quarters of a mile by road), is difficult, owing to the narrow passage between the sandbanks and the absence of landmarks. The channel is close in to the right bank when clear of the shoal point abreast Telok Anson, until a small island is reached, and which must be kept close to on the port hand; when abreast an opening in the jungle, or one cable northward of the islet, the houses of Sabatang will be seen opening of Padamar point, when steer direct for the point, allowing for the tidal stream, and keep close to that shore up to Sabatang. 15 20

Great care is necessary in making this crossing, the channel being very narrow, and the sandbanks on each side dry at low water. The least water found by the *Ringdove* (1875) in the channel at low water, spring tides, was 8 feet.

Durian Sabatang, formerly the settlement, and the highest point which may be reached by vessels drawing 11 feet, is about 35 miles from the entrance. Most of the former inhabitants have removed to Telok Anson, where all the trade is carried on. There is just room to moor off Durian Sabatang, but the place is now seldom visited. 25

Water is of indifferent quality; the best is obtained from a stream flowing over the sandbank opposite the village. The water in the river is fresh from 2 miles above Kota Satia. 30

Residency.—The Residency is at Kwala Kangsa (not charted), about 72 miles above Telok Anson, on the right bank of the river.

Sungi Kinta (*Lat. 4° 11' N., Long. 101° 0' E.*), a tributary of the Perak. Commander Singleton remarks that "returning on the 6th January, 1875, from service with the Naval Brigade at Kinta, the river was found to be greatly swollen from the few previous days' rain, and the sandbanks, which there had been great difficulty in passing when going up, had then sufficient water to allow of boats going over them. The British residency there on the island off Bandar Bharu (in Perak river a few miles above Durian Sabatang) was entirely flooded, and the guns landed were entirely under water. The river, which had 35 40

General charts 793, 794, 1355.

Chart 1355, Malacca strait.

risen at least 20 feet, fell suddenly about the 10th January, and owing to the shifting bottom (fine sand) the entire course was altered. The current on this occasion ran at the rate of 5 or 6 knots."

- 5 **Tides.**—It is high water, full and change, at the entrance to Perak river at IIIh. 15m., springs rise about 9 feet, and neaps 5 feet, and at Durian Sabatang at IVh. 45m., springs rising 12 feet. From January to March the tide falls about 2 feet lower than the average spring.

- 10 **Tidal streams.**—In the lower reaches of the river the ebb streams run at the rate of $2\frac{1}{2}$ knots and at Durian Sabatang at rates of from $2\frac{1}{2}$ to 3 knots an hour, but the duration of the streams vary considerably, depending on the rains. The tides are felt as far up as the entrance of Kinta river.

Chart 1009, Approaches to Perak river.

- 15 **SEMBILAN ISLANDS**, lying to the westward of the entrance of Sungai Perak, occupy a space of 6 miles in a north-east and south-west direction; they are mostly small, bluff, high islands, covered with trees, steep to, and may be seen from a distance of 20 miles in clear weather. There are some small sandy beaches in places on the
20 larger islands, but landing is difficult on account of the reefs fronting them.

The northern group consists of four islets and a rock.

- Pulo Nipis (*Lat. $4^{\circ} 4' N.$, Long. $100^{\circ} 32' E.$*), the western islet, is 262 feet, and Pulo Agas, the north-eastern, 186 feet high; Pulo
25 Payong, 163 feet high, lies nearly one mile south-westward of Pulo Agas, with a rock 75 feet high between them. A rock, 20 feet high, lies 2 cables north-east of Pulo Payong.

Rosa rock, with a depth of $1\frac{1}{2}$ fathoms, lies with 6 cables, 130° true, from Pulo Payong.

- 30 **The southern group** consists of six islands and two off-lying rocks.

- Pulo Rumbia, 615 feet high, the largest of the islets, has two peaks of nearly equal height; Pulo Lalang, 388 feet high, southward of it, is in two portions, joined by a reef which dries at low water. Two
35 islets, 80 and 20 feet high, lie westward of Pulo Lalang, and a rock which dries 2 feet, lies 2 cables southward of the southern one.

- Pulo Buluh, the southern islet, 460 feet high, has a flat top. Black rock, 8 feet high, is situated about $1\frac{3}{4}$ miles westward of the north end of Pulo Lalang, and White rock, 35 feet high, lies one mile southward
40 of it. The channels between the southern group of islets have not been examined.

At night the Sembilan islands should be approached with caution, as the depths are from 17 to 25 fathoms fairly close-to.

General charts 793, 794, 1355.



Gunong Bubu.

False Dinding.

Pulo Pangkor.

Pangkor Kechil.



Tanjong Katok.

The Dindings. From near Pulo Jarak.

Pulo Sembilan.

Fairway of Strait.



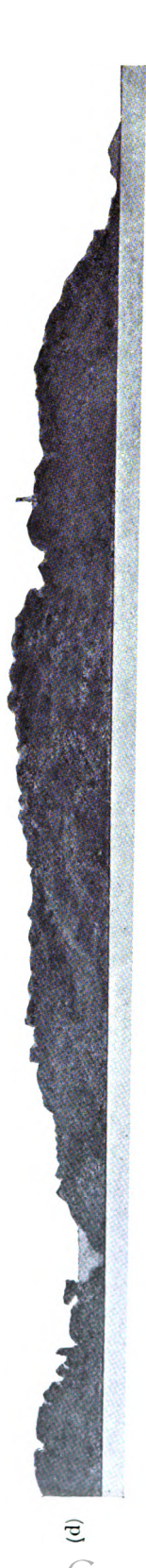
Parcelar hill.

Parcelar hill, bearing 20° true, distant 12½ miles.

(c)



One Fathom bank Lt. Ho. bearing 14° true, distant 1¼ miles.



Cape Rachado lighthouse 96° true, distant 3 miles.

(d)



Gunong Pulu.

Tanjong Bulus bearing 115° true, distant 13 miles.

Tanjong Budas.

Chart 793, Butang group to Pulo Berhala.

PULO JARAK (*Lat. 3° 59' N., Long. 100° 6' E.*), lying near the middle of Malacca strait, about 25 miles westward of the Sembilan islands, is a precipitous, thickly wooded island, half a mile in length, east and west, nearly 3 cables in breadth, and 508 feet high; in clear weather it is visible from a distance of 26 miles. It is steep-to except at the north-east extreme, where boulders, some above water, extend nearly one cable off. There are depths of 14 to 15 fathoms at a short distance off it, and much deeper water beyond. *See view a of the Dindings, abreast.*

Tides.—It is high water, full and change, at II(two)h. 30m.; springs rise 7 feet. Tidal rips were observed eastward of the island.

Tidal streams.—The flood stream sets south-eastward and ebb north-westward at the rate of about $1\frac{1}{2}$ knots an hour in the neighbourhood of the island.

GENERAL DIRECTIONS for sailing vessels.—During the north-east monsoon, north and north-east winds frequently blow strongly between Pulo Jarak and the islands at the north end of Malacca strait; sailing vessels, therefore, from the southward during that period, should, after passing Dinding islands, keep near the edge of the mudflat which fronts the coast, so that they may not be delayed by the strong wind and short sea likely to prevail in the offing near Penang.

Vessels bound south-eastward should pass between Pulo Jarak and the Sembilan islands, for the current often sets strong to the north-west in the middle of the strait, and calms are more prevalent there than near the coast; thence shape course to pass westward of North Sands and for One-fathom bank; *continued* at page 227.

KWALA BERNAM (*Lat. 3° 50' N., Long. 100° 47' E.*) is situated about 13 miles southward of the entrance of Kuala Perak. It is fronted by a mudbank with depths of 3 feet to 3 fathoms to a distance of about 3 miles. The chart does not show more than 4 feet in the approach, and the spring rise is about 8 feet. It is said to be navigable for steam launches for about 100 miles; the snags in the river would then prevent further progress.

Boundary.—The Bernam river is the boundary between the states of Perak and Selángor.

Light.—A light is exhibited from a white tower on the north point of entrance to Bernam river. *See Light list.*

Directions.—The lighthouse can be distinctly seen at 3 or 4 miles distant, showing conspicuously against the dark green trees behind, and should be steered for when bearing about 40° true. The river is only available for small craft with local knowledge.

General charts 1355, 793, 794.

Chart 793, Butang group to Pulo Berhala.

The bends of the river should be followed, avoiding the points. The deepest water is almost invariably close in to where the nipa palms grow and shoalest where there are mangroves.

- 5 H.M.S. *Moorhen*, drawing $10\frac{1}{2}$ feet water, crossed the bar of Kwala Bernam many years ago, and proceeded as far as the village of Sabah, about 20 miles from the entrance. The vessel crossed at one hour before high water, had a depth of not less than 16 feet on the bar, and 17 feet, over bottom soft mud, in the channel to Sabah,
10 where she moored in a depth of $5\frac{3}{4}$ fathoms. Apparently there is much less water on the bar. The tidal streams run strongly in the river.

Chart 794, Pulo Berhala to Cape Rachado.

- Coast.**—Between Kwala Bernam and Kwala Selangor the coast
15 is low, and covered with jungle; the mudbanks fronting it extend less than half a mile off until within 5 miles of the latter, where it extends $1\frac{1}{2}$ miles, but at about midway between the mouths of those rivers flats of sand and mud extend about $8\frac{1}{2}$ miles off the bight in the shore, with general depths of $2\frac{1}{2}$ to 4 fathoms; a patch of 5 fathoms lies just
20 within the 10-fathoms contour.

- Fishing stakes.**—Enclosures for capturing fish, 30 or 40 yards square, consisting of bamboo, strengthened by cross poles, and having a solid platform well above the water, are situated off and along the coast, a few miles apart. They are generally in depths of about
25 5 fathoms, rarely in less, and are therefore useful in defining the shallow water.

Chart 3766, North approach to Klang strait. Var. $0\frac{3}{4}^{\circ}$ E.

- SUNGI SELANGOR. — Depths.** — The depth at the entrance to this river is $1\frac{1}{2}$ feet at low water springs, the channel
30 of approach being marked by fishing stakes, which are frequently shifted, and by small tripods surmounted by basket. The depths within the entrance are from $1\frac{1}{2}$ to $2\frac{3}{4}$ fathoms, but the anchorage is indifferent, the holding ground being of soft mud, and the tidal streams strong.

- 35 Selangor river is usually navigable for steam vessels of 8 feet draught, for 14 miles, or as far as Kampong Siar, but there is little room to swing there; the bottom is soft mud. There is no danger in the river for a vessel of that draught, except a mudbank with a depth of 3 feet, and deep water close to the shore on either side of it, situated
40 about 3 or 4 miles from the entrance, off Telok Penjamon. Above Kampong Siar there are several sandbanks, but the river is navigable for cargo boats a further distance of 55 miles.

General charts 793, 794, 1355.

Chart 3766, North approach to Klang strait. Var. $0\frac{3}{4}^{\circ}$ E.

The river is tortuous in its course, the banks are low throughout, and lined with attap and mangrove trees, and the deepest water is found on the concave side.

LIGHT.—A light is shown from a white cylindrical iron tower, 90 feet in height, erected on Kwala Selángor hill. See Light list. 5

The settlement at Kwala Selángor is rendered conspicuous by the lighthouse, the rain catchment for the reservoir, and the official bungalows and rest-house, all of which are situated on Selángor hill. The native settlement, Government offices, police-station, and post-office are situated at the foot of this hill at about 3 cables within the entrance to the river. 10

The south point of the entrance is marked by the old light-tower and a white conical iron beacon, surmounted by a ball.

On the north side, within the entrance, is a Malay and Chinese settlement, and a factory for extracting oil from cocoanuts. 15

A small pier extends from the shore at this point.

Communication.—A good road connects Kwala Selángor with Klang, communication being kept up by motors, telephone, and telegraph. A railway connects it with Klang, distant 29 miles, and with Kwala Lumpur, and thence with the main line. 20

Trade.—The exports are tin, guttapercha, gharuwood (lignum aloes), ivory, bark, hides, salt fish, and rattans; the imports are rice, salt, opium, tobacco, tea, and oil. Tin is brought by boats from the mines up the river, and taken to Singapore by coasting steamers. 25

Directions.—Vessels should approach Sungai Selángor with the lighthouse bearing 61° true, which will lead to the entrance of the channel.

Tides.—It is high water, full and change, at Sungai Selángor, at IVh. 36m.; springs rise $12\frac{1}{4}$ feet, neaps 9 feet. 30

Tidal streams.—The flood stream in the river runs 5 hours, the ebb for 7 hours, sometimes attaining the rate of 5 knots an hour.

COAST.—Between Selángor and Klang islands the coast is thickly wooded, low, and flooded in most parts at high water. It is skirted by the mudbank, dry at low water, to the distance of about one mile, with rocks and shallow water at 3 miles off abreast Jeram hospital, gradually nearing the shore southward. 35

General charts 794, 1355.

Chart 3453, Klang strait and approaches.

KLANG STRAIT. — Depths. — Klang strait, situated between Pulo Klang and Pulo Che Mat Zin on the western side, and Pulo Lúmut with the mainland on the eastern side, is divided into
 5 two parts, North Klang strait and South Klang strait; it presents no great difficulties for vessels of moderate or even fairly deep draught.

The northern entrance has a depth of 5 fathoms in its fairway, and there is not less depth in the strait until the bar of the south entrance is approached.

10 The southern entrance has a bar with a depth of $3\frac{3}{4}$ fathoms on the leading mark, deepening within, and continues deep, or with not less than 5 fathoms in the fairway, and out through the northern entrance of the strait.

For Port Swettenham, *see* page 215.

15 **Klang islands.—Pulo Klang**, densely wooded, with mangrove trees, and about 7 miles in length and 4 miles in breadth, forms the western side of Klang strait, which at this point is nearly $1\frac{1}{2}$ miles broad. Light, page 210.

Pulo Che Mat Zin, situated south-westward of Pulo Klang, from
 20 which it is separated by a narrow channel, forms the western side of South Klang strait, and westward of Pulo Klang and Pulo Che Mat Zin are situated Pulo Ketam, Pulo Tengah, and Pulo Pinto Gedong, the southernmost of the group, which is inhabited by Chinese and Malay fishermen, with a Custom-house at the largest village, and a
 25 lighthouse (page 213) at its south-east extreme.

All these islands are formed of black mud, and are densely wooded with mangrove trees and bushes, being in most parts swampy at high water. The creeks and channels which separate and intersect them are tortuous, and not much used except by native small craft; they
 30 abound with crocodiles.

Extensive mudbanks exist to the westward of this group of islands, while new islands are being formed and the present ones extending in all directions.

Pulo Lumut is 9 miles in length, and forms the eastern side of
 35 Klang strait; between its north-west extreme and Deepwater point the strait is 4 cables wide between the 5-fathoms contour lines.

Shoal water, with less than 3 fathoms, extends one mile south-westward from Tanjong Buas Buas, the south-west extreme of Pulo Lúmut.

General charts 794, 1355.

Chart 3766, North approach to Klang strait.

NORTH APPROACH. — **General remarks.** — The northern approach is bounded on the west by Pulo Angsa banks, which, within a depth of 5 fathoms, extend 25 miles in a north-westerly direction from Pulo Klang, and on the east by the extensive mudbank, with rocks above water in places, fronting the coast southward of Kwala Selangor. Discoloured water marks the edges of these banks. 5

Fishing stakes extend into deep water on either side of the strait, but are generally within the 3-fathoms contour line; they are mostly of bamboos; the platforms from which the nets are suspended are always above high water, being marked by tall bamboos and small flags. They are continually being shifted, but do not extend into the main channel much beyond the 3-fathoms contour line. 10

Fishing-boats at times frequent the approaches to the North strait in great numbers, and lay their drift nets right across the channel. These nets are marked by wooden floats, and have a boat at each end of the net. 15

Anchorage can be obtained in the strait and over all parts of the northern approach in convenient depths, the bottom being of mud and sand. A good position, in 12 fathoms, mud bottom, is with Pulo Angsa bearing 275° true, distant 3 cables. 20

Islands and dangers.—Western shore.—Bank.—From the north-east extreme of Pulo Klang a bank of sand and mud, the centre of which breaks at about half ebb, extends a distance of 25 miles in a 309° true direction, to the 5-fathoms contour, from which Kwala Selangor lighthouse bears about 87° true, distant 14½ miles. The 3-fathoms contour lies about 3½ miles within the 5-fathoms contour. 25

Light-buoy.—A red buoy, with an *occulting white light* (six seconds light, three seconds eclipse), is moored northward of the 5-fathoms north-west extreme of the bank, in a depth of 11 fathoms. 30

Westward of this bank are the North sands.

Charts 3453, 3766.

Pulo Angsa and Pulo Selatan (South island) are two small wooded islands 91 and 92 feet high, respectively, close together, and situated about 5½ miles off the coast, on the edge of the 3-fathoms contour of the bank just described, at 9 miles north-westward of Pulo Klang. The bank dries at low water for some miles north and south of Pulo Angsa, and the 3-fathoms edge trends nearly north and south of Pulo Angsa, and the 3-fathoms edge trends nearly 40

A Government rest-house and pier, in conjunction with the light-keeper's quarters, is situated in the light on the east side of Pulo Angsa; landing is easily affected at all times. These islands are uninhabited except by the light-keepers. 45

General charts 79½, 1355.

Charts 3453, 3766.

LIGHTS.—Pulo Angsa (*Lat. 3° 11' N., Long. 101° 13' E.*).—From a white circular tower, 35 feet in height, erected on Pulo Angsa, a light is shown. *See* Light list for these lights.

- 5 **Tanjong Bakau.**—From a white tripod beacon, erected on the outer edge of the shoal extending northward from Tanjong Bakau, a light is exhibited.

- 10 **Tanjong Sau.**—From a flagstaff, situated on Tanjong Sau or Deepwater point, 4 miles southward of Tanjong Bakau, two lights are exhibited.

- 15 **A spit** with depths under 3 fathoms extends about 4 cables northward of the north-west extreme of Pulo Lúmut, forming the south side of the approach to Port Swettenham. From a white tripod erected on it, $8\frac{1}{2}$ cables eastward of Tanjong Sau, and north-west of Labuan Garap, is exhibited a light (also on chart 2153).

- 20 **Signal station.**—A signal mast, with yard and gaff, 100 feet in height, is situated at the extremity of Tanjong Sau. This station is used to signal to Port Swettenham the arrival of vessels through either strait, those entering South strait being signalled from the south yardarm, and those entering North strait from the north yardarm.

- 25 **Shoal.**—A narrow shoal, with depths of one to 3 fathoms, separated from Pulo Klang by a narrow channel, extends $1\frac{3}{4}$ miles northward of Tanjong Sau, its outer side being 4 cables distant from the island; it is fairly steep-to.

There are patches of $4\frac{1}{2}$ to 5 fathoms in the fairway, north-eastward of this shoal. For dangers southward of Tanjong Sau, *see* South entrance beacons.

- 30 **Fairway.—Batu Penyu**, or Glamorganshire rock, a small rock with a depth of $2\frac{1}{2}$ fathoms, and steep-to, is situated in the fairway, with Pulo Angsa lighthouse bearing 173° true, distant $2\frac{8}{10}$ miles; it is generally marked by eddies and overfalls and is also at times the resort of numerous fishing boats which frequent these waters.

- 35 Two white discs, one on the north-east side of Pulo Angsa, and the other on Pulo Selatan, when in line, point to the rock.

Light-buoy.—A white conical light-buoy, showing an *occulting red light every seven seconds* (*four seconds light, three seconds eclipse*), is moored close to the north-east side of the rock.

- 40 **Clearing marks.**—The left extreme of Pulo Besar, on which is a beacon 26 feet high, bearing 105° true, leads well northward of Batu Penyu; whilst Bukit Jugra (Parcelar hill) kept open eastward of Pulo Angsa, bearing 149° true, leads in the fairway between the rock and the shallow bank extending northward from Pulo Angsa.

- 45 **Eastern shore.**—The following islets and dangers lie on the eastern shore of the northern approach to Klang strait.

General charts 794, 1355.

Charts 3453, 3766.

Islands.—A group of four islets, consisting of Pulo Besar, the largest of the group, 75 feet high; Pulo Tekukor, 63 feet high; Pulo Jemor, 34 feet high; and Pulo Anak Angsa, 15 feet high, is situated on the mudbank fronting the shore on the eastern side. These islands are generally easily recognised, being of a reddish colour, and covered with scrub; interspersed amongst the islets are several rocks and shoals, the whole being fronted by a shallow mudbank, which breaks occasionally at low water. This area should be avoided; bearings of the islets and of Batu Mandi beacon, which shows up well, enabling a vessel to do so.

Beacon.—A white beacon, 26 feet high, has been erected on Pulo Besar.

Pulo Anak Angsa is marked by a solitary tree.

From the group of islets, shoal water, with depths of less than 3 fathoms, extends $3\frac{1}{2}$ miles in a north-westerly direction.

Batu Mandi, or Sail rock, half a cable in diameter, dries 9 feet at low water springs with depths of 4 fathoms around; it lies 230° true, distant about 7 cables from Pulo Tekukor.

Beacon.—Batu Mandi is marked by a white cylindrical masonry beacon, surmounted by a staff and globe at 18 feet above high water.

Shore mudbank.—From abreast Batu Mandi rock the 3-fathoms contour gradually nears the shore. Off Tanjong Serdang, the mudbank dries off it about half a mile; from thence southward the bank, which dries at low water, decreases in breadth, and southward of Dua rivers almost disappears, as charted.

Beacons.—The two beacons at entrance to Sungai Dua Besar in line apparently lead in the fairway between the flat extending northward of Tanjong Bakau and the eastern shore. The back beacon, situated on the south point of the river, is a structure 16 feet high, painted white, black, white, in vertical stripes, surmounted by a white disc. The front beacon is a diamond, painted red, white, red, in vertical stripes, on a white screw pile. The light-keeper's quarters, southward of Tanjong Bakau light-structure, form a good mark.

Tides.—See page 214.

Charts 3766, 3453, 2153.

Directions.—Approaching Klang strait for Port Swettenham from the northward, the lead will keep a vessel in the channel. From a position well eastward of the *occulting* light-buoy marking the north-west extreme of the bank forming the western side of the approach, a vessel should steer south-eastward into the strait, and when Pulo Angsa is seen it may be steered for bearing about 154° true until about $3\frac{1}{2}$ miles from it, from whence Bukit Jugra (Parcelar hill) just open eastward of Pulo Angsa, bearing 149° true, will lead between the western mudbank and Batu Peny *occulting* light-buoy.

Pulo Besar beacon on the eastern shore, with Pulo Angsa on the west, afford easy means of fixing the vessel. Give the latter a prudent berth,

General charts 794, 1355.

Charts 3766, 3453, 2153.

and steer about 138° true for the fairway of the strait, with the beacons at Sungi Dua Kechil and Sungi Dua Besar in line, checking the position by a bearing of the keepers' dwellings south of the light and the light-tripod off Tanjong Bakau; Pulo Angsa must not be brought to bear northward of 312° true. From abreast Tanjong Bakau keep rather towards the eastern shore to avoid the bank northward of Tanjong Sau, which is cleared by keeping the back beacon (about 6 cables westward of Labuan Garap) open of the front one (page 215). The beacons at the entrance to Port Swettenham, bearing 172° true, are a good fairway mark, and the depth is not less than 5 fathoms, until Tanjong Sau lighthouse bears 211° true, from whence course should be altered to pass about 2 cables off it, if going direct through the strait; or into Port Swettenham, as requisite.

If proceeding through, *see* the directions for South entrance and reverse them; for Port Swettenham, *see* page 216.

Vessels working into the strait must be guided by the soundings and the chart; the bottom is soft and not likely to damage any vessel touching, and the water is invariably smooth.

Anchorage.—There is good anchorage outside, in Klang strait, in 10 fathoms, mud bottom, with ample swinging room, with the light-beacon bearing 146° true, and the outer port limit beacon, with diamond top, situated north of Tanjong Gila, bearing 36° true.

At night.—The lights and light-buoys are apparently sufficient guide for the navigation of the strait at night, at any rate for those locally acquainted. The lead is a good guide except in the neighbourhood of Pulo Angsa light, where the bank is steep-to.

THE SOUTHERN ENTRANCE to Klang strait is between Pulo Lumut on the east and Pulo Klang and the islands southward of it on the west. Its narrowest part is rather under half a mile wide abreast Pulo Che Mat Zin, but is free from danger.

Bar.—The approach is barred by a bank extending southward from the islands gradually shoaling from a depth of 10 fathoms at $2\frac{1}{2}$ miles southward of them to a least depth of $3\frac{1}{2}$ fathoms over the bar, with depths of not less than 8 fathoms in the fairway up to the entrance of Port Swettenham, and not less than 5 fathoms in the fairway of the strait out through the northern entrance.

Shoals.—A bank, with depths under 3 fathoms, extends half a mile southward of the south end of Pulo Pinto Gedong, west side of the entrance.

A flat extends a quarter of a mile southward of the south end of Pulo Che Mat Zin.

Beacons.—An iron screw pile white beacon, 16 feet high, with disc topmark, is situated a little northward of First point of Pulo Che Mat Zin. Mudflats, dry at low water, connect the north end of that island with Tanjong Sau, its outer edge being marked by beacons 20 and 15 feet high, respectively, similar to that near First point.

General charts 794, 1355.

Charts 3766, 3453, 2153.

Two beacons are erected on the eastern shore at about $3\frac{1}{10}$ miles above Tanjong Buas Buas, and $2\frac{3}{4}$ miles south-west of Second point. The inner or northern beacon consists of a structure 16 feet high, painted white, black, white, in vertical stripes, and surmounted by a white disc; the outer one, 225° true, from the inner, is a diamond, painted red, white, red, in vertical stripes, on a white screw pile surmounted by three plates of iron with spaces between. As long as they are open of Tanjong Che Mat Zin a vessel will be clear of the flat extending off Pinto Gedong lighthouse, towards which the north-going stream sets strongly.

Flats.—On the eastern side of the entrance, a mudflat extends about one mile south-westward of Tanjong Buas Buas, the south-west extreme of Pulo Lúmut.

A flat, with a depth of $2\frac{3}{4}$ fathoms at its extreme, subject to change, extends about $3\frac{1}{2}$ cables off the point situated 8 cables northward of Tanjong Buas Buas.

Beacon.—A detached patch of 3 fathoms, the outermost of the shoals extending off Tanjong Buas Buas, lies eastward of the leading mark for the entrance, at 8 cables, 255° true, from that point.

A beacon is being built on this patch, temporarily marked by a light-vessel moored southward of it, marked “P.P. Gedong Bar 3-fathoms patch.” Vessels should not pass eastward of this beacon.

The east side of approach to Kwala Selat Lúmut, southward of the point of same name, is fronted by a mudflat, partly dry at low water, to the distance of three-quarters of a mile.

Above the south end of Pulo Che Mat Zin, the strait on both sides is free from danger up to Second point, on which is a white beacon, 16 feet high, with diamond topmark, situated abreast the beacon, 20 feet high, on the mudflat opposite it.

A beacon is situated at nearly 2 miles north-eastward of Second point beacon, with Sungi Chondong between, the southernmost of the port limit beacons.

A spit, with depths of one foot to 3 fathoms, fronts the entrance to this inlet, and extends alongshore north-eastward for the distance of half a mile, its extreme being $1\frac{1}{2}$ cables off-shore; it should be given a berth when passing.

LIGHTS.—A light is shown from a white steel structure on piles, erected on the south-east extreme of Pulo Pinto Gedong, east side of the entrance. The lights within this are Tanjong Sau and the light-beacon abreast it, before mentioned with the Northern entrance. See Light list.

DIRECTIONS for South entrance.—Vessels approaching from the southward should steer for Pinto Gedong lighthouse, bearing about 15° true, until the leading mark for the bar comes on, namely, the flagstaff on Tanjong Sau (Deepwater point), seen through the

General charts 794, 1355.

Charts 3766, 3453, 2153.

strait between the white beacons on First and Second points, bearing 37° true, which being steered for leads across the bar in $3\frac{3}{4}$ fathoms least water, and westward of the beacon under construction on the
 5 3-fathoms patch south-west of Tanjong Buas Buas; above Pinto Gedong lighthouse no difficulty will be experienced in navigating the strait, as the shores are fairly steep-to, and the tidal streams run fairly through, but the indraught, or outset from the channel between Pulo Che Mat Zin and Pulo Klang should be guarded against.

10 The beacons, erected at $3\frac{1}{10}$ miles above Tanjong Buas Buas, in line bearing 45° true, are a good mark for the bar in thick weather, when the more distant mark may be hidden.

These beacons are also useful should vessels meet on the bar, as they will, being in sight, show how far the vessel going south can keep
 15 towards the Pinto Gedong side.

Tides.—It is high water, full and change, at Tanjong Che Mat Zin at IVh. 58m.; mean springs rise $12\frac{1}{2}$ feet, mean neaps rise 9 feet, mean neaps range 4 feet. At Pulo Angsa, at IVh. 43m.; mean springs rise $13\frac{1}{4}$ feet, mean neaps rise $9\frac{1}{2}$ feet, mean neaps range $5\frac{1}{8}$ feet.

20 **Tidal streams** run everywhere with considerable strength, but were found not to exceed, as a general rule, 3 knots, the maximum velocity being attained about 2 hours before high and low water. They generally set parallel to the shore in both straits, but care must be taken, when passing the various creeks and channels, that the vessel be
 25 not set into or from them. This is especially the case off Tanjong Che Mat Zin.

Off Pulo Pinto Gedong lighthouse, at springs and neaps, the north-going stream makes $2\frac{1}{2}$ hours after high water at Port Swettenham; at springs this south-going stream makes 3 hours before, and at neaps
 30 $3\frac{1}{2}$ hours before high water at Port Swettenham; there is a period of slack water for three-quarters of an hour at springs, and for one hour at neaps.

Southward of Tanjong Sau at springs the north-going stream makes about 4 hours after, and at neaps $3\frac{1}{2}$ hours after high water at Port
 35 Swettenham; at springs and neaps the south-going stream makes $2\frac{1}{2}$ hours before high water at Port Swettenham; there is a period of slack water for 25 minutes at springs, and 40 minutes at neaps.

In North Klang strait at springs the north-going stream makes $2\frac{1}{4}$ hours after, and at neaps $2\frac{3}{4}$ hours after high water at Port Swettenham; at springs the south-going stream makes $4\frac{1}{4}$ hours before, and
 40 at neaps 4 hours before high water at Port Swettenham; there is a period of slack water for about one hour.

Off Pulo Angsa at springs the north-going stream makes $1\frac{3}{4}$ hours after, and at neaps $1\frac{1}{4}$ hours after high water at Pulo Angsa; at
 45 springs the south-going stream makes $5\frac{1}{4}$ hours before, and at neaps $4\frac{1}{2}$ hours before high water at Pulo Angsa; there is a period of slack water for about one hour at springs and about $1\frac{1}{2}$ hours at neaps.

General charts 794, 1355.

Charts 3766, 3453, 2153.

At 5 miles south-westward of the entrance to Sungai Selangor the north-west-going stream makes at from $1\frac{1}{2}$ to 2 hours after high water on the shore, and attains its greatest strength of about $1\frac{1}{2}$ knots at $5\frac{1}{2}$ hours after high water. The south-east-going stream makes at $4\frac{1}{2}$ hours before high water on the shore, and attains its greatest velocity of about 2 knots at 2 hours before high water. 5

Plan 2153, Port Swettenham.

PORT SWETTENHAM or Kwala Klang.—Depths in fairway.—Port Swettenham, the approach to Kwala Klang from Klang strait, is about 2 miles long in an east and west direction, and from 3 to 5 cables broad, with depths of about 5 fathoms within half a cable of the southern shore. Westward of Tanjong Gila, the north entrance point, is a bar, through which a channel has been dredged to a depth of 26 to 27 feet at low water springs over a breadth of 110 feet. A shallow flat extends off the northern shore within that point, the 3-fathoms contour line in places being distant as much as $2\frac{1}{4}$ cables from it; there is also shoal water off Tanjong Lumut or Dalik, making it necessary to use caution when going alongside or leaving the piers at Swettenham; shallow water also extends off the passenger jetty, at the entrance to Klang river, north-east side of the port. 10 15 20

Port limit beacons.—There are several beacons marking the port limits; they are all iron skeleton frameworks surmounted by diamond shapes, but, being small, are not conspicuous, and will probably be in time hidden by the rapid growth of the mangrove trees. 25

Two of these beacons are situated in North Klang strait and mark the northern port limits of Port Swettenham; the eastern beacon is situated about one mile northward of Tanjong Gila, the western is situated about $1\frac{1}{4}$ miles northward of Tanjong Sau or Deepwater point on Pulo Klang. 30

The beacon on Tanjong Sau, and the one southward of it, on the opposite side of the strait, mark the south limit of the port.

Similar beacons are situated on each side of the entrance to the harbour, as charted, one northward of Tanjong Gila and the other on the east point of the Labuan Garap. 35

A mark has been placed on each side of the harbour at one mile from the passenger jetty; and a vessel anchoring outside these marks when there is room inside is charged extra for the use of lighters and tugs.

Beacons.—A mark consisting of a white disc has been erected a little northward of the flagstaff on Tanjong Sau. Eastward of Labuan Garap are two beacons; the outer is in the water, a diamond, painted red, white, red, in vertical stripes on a white screw pile; the inner consists of a structure 16 feet high, painted white, black, white, in vertical stripes, surmounted by a white disc. These in line lead through the dredged channel over the bar. 40 45

At $8\frac{1}{2}$ cables westward of Labuan Garap are similar beacons; these

General charts 794, 1355.

Plan 2153, Port Swettenham.

in line lead eastward of the flat extending off and northward of Deep-water point (Tanjong Sau), and are of great use to vessels leaving Port Swettenham for the South channel, as at low water, vessels find it difficult to turn without getting very close to the shoal; the inner beacon must not be opened westward of the outer one.

The light-beacon, south side of the entrance, is referred to with Tanjong Sau light, page 210.

Buoys are laid down as moorings for the Government launches north-westward of the passenger jetty.

Signal station.—There is a signal station and flagstaff between the passenger jetty and the next pier southward of it. Signals are repeated to this station from Tanjong Sau, and vessels can communicate by International code.

Anchorage.—Vessels may anchor as convenient providing they do not obstruct the approach to the piers; long vessels are required to moor. A good anchorage for small vessels is with the signal station flagstaff, bearing 40° true, distant $1\frac{3}{4}$ cables, and for large vessels with the same flagstaff bearing 76° true, distant $3\frac{1}{2}$ cables.

Moorings.—Three sets of heavy moorings have been laid down, numbered 1, 2, and 3, as charted, in depths of about 9, 6, and $5\frac{1}{2}$ fathoms, respectively. A dredge is at work on a shoal near the passenger jetty; when this is removed a mooring will be provided for heavy draught vessels (October, 1915).

Lights.—Lights are exhibited to assist vessels when leaving after dark. One is on the flagstaff and the other on a beacon 80° true from the flagstaff. A light is also exhibited on the end of the passenger jetty.

Directions.—To enter the port, coming from the northward, from between the beacons marking the northern port limit at about one mile northward of Tanjong Gila, steer for the beacon with large disc marked "Labuan Garap," in that creek just touching the mangroves on its eastern shore, bearing 176° true, until the two beacons eastward of Labuan Garap are in line bearing 163° true; steer for them through the dredged channel, until the beacon just north of Tanjong Sau flagstaff is just open southward of the beacon on south side of entrance, and being kept so, astern, will lead in the fairway up the port to the anchorages.

Tides.—It is high water, full and change, at the passenger jetty, at Port Swettenham, at Vh. 13m.; mean springs rise $13\frac{1}{4}$ feet, mean neaps rise $9\frac{1}{2}$ feet, and mean neap range is $5\frac{1}{8}$ feet.

Tidal streams.—The tidal streams attain a velocity of from $2\frac{1}{2}$ to 3 knots at springs, the east and south-going stream being stronger than the west and north-going stream. They attain their maximum velocity about two hours before high and low water by the shore. Off the passenger jetty at springs the east-going stream ends $1\frac{1}{2}$ hours after, and at neaps $1\frac{1}{4}$ hours after high water by the shore; at springs

Plan 2153, Port Swettenham.

and neaps the west-going stream ends $5\frac{1}{4}$ hours before high water by the shore; there is a period of slack water for about 10 minutes both at springs and neaps.

At the anchorage the east-going stream ends about a quarter of an hour later, and the west-going stream about three-quarters of an hour earlier than off the passenger jetty.

The town of Port Swettenham, on the eastern side of the entrance to Sungai Klang, is well laid out, and contains the Harbour Master's house, Marine office, Rest House, and a number of other buildings. The buildings inshore of the railway line are hidden by trees. It is the terminus of the railway from Klang.

Owing to the fact that the land on which the town is built was all originally mangrove swamp, that part which has not been reclaimed and drained is swampy at high water, and infested by mosquitoes, consequently malaria is endemic, and the town is not considered healthy.

Communication.—Port Swettenham has regular steamship communication with Singapore, Malacca, Port Dickson, Penang, and Telok Anson three or four times a week; railway communication with Klang ($5\frac{1}{2}$ miles) and Kwala Lumpur, thence with the other lines of the States as far as Penang, Pahang, and Johore; there is telegraphic and telephonic communication with all parts. See Chapter I., page 4.

Trade.—See page 3.

Supplies are easily obtained from the various contractors at Klang, about 9 miles up Sungai Klang, and are of good quality. Ice can be obtained at Port Swettenham.

Water is, as a rule, plentiful; there are standpipes on the wharves and one on the outer end of the passenger jetty for the use of vessels, and a tank to bring water alongside vessels in the harbour.

Coal.—No coal was obtainable up to 1914, the Government launches and engines all using wood fuel. Coal has been discovered at Rawang, near Kwala Lumpur, and a line has been constructed to connect the mine with the railway system. Its value for steaming purposes is not yet known. Coal can be obtained by rail from Penang or Singapore if required. There are three steam launches and many lighters available.

Piers.—Five piers project westward from the high-water level frontage of the town; the northern is the passenger jetty, an iron pile structure extending out a distance of 70 yards, and connected by a covered way with the railway station; it has a depth of 13 feet at low water alongside its northern end, and there are landing steps for boats inside that end. There is a small pontoon pier near the flagstaff for passengers to land.

South of the passenger jetty are three iron T-headed jetties known as North, Middle, and South piers; their sea frontage is 100 feet each, and there are depths of 18, 17, and 11 feet, respectively, alongside

General charts 3453, 794, 1355.

Plan 2153, Port Swettenham.

their outer ends at low water. It is at these piers that all coasting vessels discharge their cargoes, they being connected with the railway.

- 5 The southernmost pier is a pontoon pier, to be used by the railway for discharge of coal, &c.

A wharf, 1,200 feet long, suitable for vessels of deep draught, has been completed between the cattle quarantine station and the other quarantine station; there is a depth of 30 feet alongside at low
10 water springs.

Two boat slips have been constructed north of Tanjong Kubu, and are for the use of Government launches and lighters.

Repairs to foreign or merchant vessels might be undertaken, under special consideration, by the Government at their railway work-
15 shops, Kwala Lumpor, a distance of 26 miles by rail.

Quarantine station.—There is a large quarantine station southward of the town, consisting of several iron-roofed sheds conspicuous from the anchorage. This station is used for the examination of coolies, on their arrival from Indian ports, before they are allowed
20 to proceed to the various estates. Another part of the station is used for the examination of cattle.

Chart 794, Pulo Berhala to Cape Rachado. Var. $0\frac{3}{4}^{\circ}$ E.

SUNGI KLANG.—The banks of Sungai Klang for a distance of 30 or 40 miles in the interior are high and covered with mangroves
25 and various sorts of palms. The river is narrow and tortuous, and is not used now by any but small launches, and then only as far as the town of Klang, as the river is there spanned by an iron bridge, opened in 1908, and known as the Belfield bridge, which leaves no room for any but small craft to pass under it.

30 **Klang** (*Lat. $3^{\circ} 2' N.$, Long. $100^{\circ} 27' E.$*).—The town of Klang, the head-quarters of the District Officer, is of considerable importance, being the centre of a district rich in the produce of rubber. There is excellent communication by road or rail, the estates on both sides of the river being in direct communication with Klang by means of
35 Belfield bridge. There is telegraphic and telephonic communication with all parts.

Communication.—A railway connects Klang with Port Swettenham, Kwala Selangor, and Kwala Lumpor, and thence with main line; there is telegraphic communication with all parts, and by
40 telephone with Port Swettenham and other places.

Kwala Lumpor (*Lat. $3^{\circ} 9' N.$, Long. $101^{\circ} 42' E.$*), the capital of Selangor, where there is a British Resident, is distant from 36 to 38 miles by the river and 22 miles by the railway from Klang; it has a population of about 32,000, and is the seat of Government for the
45 Federated Malay States. See pages 3, 4, of the Federated Malay States.

General chart 1355.

Charts 3453, 2153.

Selat Lúmut (*Lat. $2^{\circ} 52\frac{1}{2}'$ N., Long. $101^{\circ} 16'$ E.*).—The eastern side of Pulo Lúmut (page 212) is separated from the mainland by Selat Lúmut, half a mile wide, and fronted by the flat mentioned with South entrance to Klang strait. 5

It is not used by any but the natives in their small boats; the Government launches running to Jugra from Port Swettenham using, as a rule, South Klang strait, and entering Sungai Langat from seaward. It has not been surveyed in detail, but it appears that a small vessel of not more than 10 feet draught could easily navigate it. 10
About half a mile southward of Tanjong Lúmut or Dalik at its north end is situated an island covered with trees whose tops are about 50 feet high. The best water is found westward of this island, and from thence by following the general rule of keeping in the bends and avoiding the points, a small vessel of the before-mentioned draught 15
could easily navigate this strait.

Chart 794, Pulo Berhala to Cape Rachado. Var. 03° E.

COAST.—From Tanjong Selat Lúmut the coast trends south-eastward for about 8 miles to the mouths of Sungai Langat, fronted by mudbanks to the distance of three-quarters of a mile in places and 20
partly dry at low water.

SUNGI LANGAT has two mouths, one of which, the Langat, opens into Selat Lúmut (chart 3453), the other, the Jugra, into the sea to the south-west of Bukit Jugra. This river is not frequented by any but the natives in their small boats, and has not been surveyed 25
for many years.

Charts 794, 795.

Kwala Jugra (*Lat. $2^{\circ} 48'$ N., Long. $101^{\circ} 24'$ E.*), the southern mouth of Sungai Langat, enters the sea 10 miles south-eastward of Selat Lúmut, and has about 3 feet on the bar at low water, 3 to 8 fathoms 30
within, as far up as Bukit Jugra, and is probably navigable for vessels of about 7 feet draught for about 10 miles. The shore bank, extending 2 miles off the mouth of the river, is steep-to, and shoals suddenly from about 15 fathoms to 3 fathoms, and within that to one or 1½ fathoms apparently; it is usually marked by fishing stakes. 35

There is another channel to Jugra village, situated about 4 miles westward of the Jugra, named Sungai Ayer Itam, said to be navigable for vessels of 7 feet draught at all times, and to be marked by beacons. According to the chart the mudflat dries off it.

Light.—A light is shown from a white iron pillar erected on the 40
south point of entrance to Kwala Jugra. See Light list.

Directions.—The entrance to Kwala Jugra may be recognised by the light-pillar and police-station on its south entrance point, and

General chart 1355.

Charts 794, 795. Var. $0\frac{3}{4}^{\circ}$ E.

by Bukit Jugra, and the latter kept on a 34° true bearing leads up to the bar beacon. It can only be entered by small craft with local knowledge.

- 5 Within the bar the river is about one cable wide, with depths of from 3 to 8 fathoms, as far as Parcelar hill, where several branches of the river unite, and where also there is anchorage. The tidal streams in the river are strong, and there are snags in places.

- Bukit Jugra, or Parcelar hill**, on the eastern bank of the
10 Jugra river at about 3 miles from the sea, is, when seen from the northward or westward, of an oblong shape sloping at both ends, but from the southward it appears conical. It is 790 feet high, thickly wooded, isolated, and being the only hill near the sea coast, is easily recognised, and in clear weather may be seen from a considerable
15 distance. See view *b* on page 205.

- Langat village is about 6 miles from the sea by the Jugra branch, and Jugra village, about $2\frac{1}{2}$ miles below it, is situated at the foot of Parcelar hill. The water is deep off Jugra village, and the granite face of Parcelar hill comes close down to the bank; there is a police
20 station and a good landing place. The district officer lives on the hill, and a palace of the Sultan of Selangor is on the eastern side of the hill, with a road leading to it from the landing.

- COAST.—Parcelar point** (*Lat. $2^{\circ} 41' N.$, Long. $101^{\circ} 30' E.$*) is situated about 9 miles south-eastward of Sungai Jugra, and being
25 round and similar to the adjacent coast is not easily distinguished; Kinsara village is a little eastward of the point. The shore mudbank extends off about 4 cables, with a depth of 14 fathoms close-to.

- From Parcelar point to Sungai Sepang Besar, a distance of 15 miles, the whole of the coast is low, thickly wooded, and skirted by a sand
30 and mudbank which extends from a quarter to half a mile seaward; a few small streams discharge through it. Few villages or huts are visible, yet it is inhabited by fishermen who, apparently, live a short distance from the beach, for smoke may constantly be seen rising all along the coast.

- 35 **Sungai Sepang Besar** is navigable for craft of about 6 feet draught for a distance of 14 miles; the bar, according to the charts, is dry at low water, but within the water deepens from 2 to 6 fathoms as far as Kankar, where there is a Chinese village.

- Light.**—A light is shown from a platform on piles, on the edge of
40 the drying bank off the entrance. For local use only.

Boundary.—The Sungai Sepang Besar is the boundary between Selangor and Negri Sembilan.

General chart 1355.

Charts 794, 795.

Sungi Lukut, $4\frac{1}{2}$ miles eastward of Sungi Sepang Besar, may be entered at high water spring tides, by vessels of 9 feet draught; steam launches can ascend about 5 miles, as far as Raja Bot house; at the mouth of the river is a village. 5

Between Sungi Lukut and Tanjong Kamuning, the south extreme of Kwala Lukut, is Pulo Burong, an isle skirted by rocks and surrounded by shallow water.

Water.—There are two good fresh-water streams in the bay on the east side of entrance of Sungi Lukut. 10

Bambek shoal, 3 miles from the coast, and situated nearly midway between Parcelar point and Cape Rachado, dries near its centre, and is composed of hard sand. Within a depth of 3 fathoms, it is 2 miles in length, in a direction parallel to the coast, 7 cables in breadth, and mostly steep-to, the water deepening suddenly to 8 or 10 fathoms within one cable. Between Bambek shoal and the coast is a small shoal, with a depth of $3\frac{1}{2}$ fathoms, with irregular soundings around it, and between this small shoal and the coast the depths are about 14 fathoms. 15

Westward of the north-west extremity of Bambek shoal are detached banks of 7 and 10 fathoms, the western with 10 fathoms being distant 6 miles from the dry patch. 20

Four miles eastward from the dry part of Bambek shoal is the north extreme of a sand ridge, from half a mile to one mile wide, which extends nearly to Cape Rachado, a distance of 10 miles; it has a dry patch nearly in the centre, and depths of from one fathom to 5 fathoms over the remainder. Between the ridge and the shore there is a channel about half a mile wide, used by local craft, and leading to Arang Arang anchorage. 25

Vessels should not bring Cape Rachado lighthouse or its light to bear southward of 115° true, to ensure passing seaward of Bambek shoal, and the shoals inshore of it. 30

Plan of Arang Arang anchorage, 1143.

ARANG ARANG ANCHORAGE or Port Dickson.

—Pulo Arang Arang, an island about $1\frac{1}{2}$ cables in diameter, is situated about a quarter of a mile southward of Tanjong Kamuning, and the space, about $1\frac{1}{2}$ cables wide, between the reefs projecting from either side, is known as Arang Arang anchorage, or Port Dickson. The island is fringed by a flat, with rocks in places to the distance of half a cable; to the eastward it connects with the shore flats. The approach to the anchorage is from the south-westward, over the sand ridge above mentioned, which here has a depression in it with a depth of $4\frac{1}{4}$ fathoms at low water in the fairway over it. There is apparently deeper water along the shore to the north-westward, but this channel has not been examined. 35 40 45

General chart 1355.

Plan of Arang Arang anchorage, 1143.

Pier (*Lat. 2° 31' N., Long. 101° 47' E.*).—The pier at Arang Arang settlement, extending from the south-east side of Tanjong Kamuning, is 720 feet in length, 460 feet of which is masonry, the remainder of
5 iron; it has a depth of 23 feet alongside at low water, over a length sufficient for two ordinary coasting steamers; an iron extension has a depth of 7 fathoms at its outer end. There is a large galvanised iron shed, with an arched roof, at the outer end of the masonry portion of the pier. The railway runs on the pier, and vessels can
10 discharge cargo into the railway trucks.

Lights.—A light is shown from a white iron skeleton tower, 40 feet in height, situated near the centre of the pier.

A light is exhibited on the mudflat, at an elevation of 57 feet above high water, from a wooden standard situated 57° true, distant
15 200 yards from the pier light. *See* Light list and charts.

Shoals.—A coral patch, with a depth of one fathom, and 6 to 7 fathoms around, lies in the approach to Arang Arang, 4 cables, 241° true, from the centre of Pulo Arang Arang; it is marked by a buoy westward of it.

20 Tanjong Kamuning, and the coast eastward of it to the pier, is a flat with rocks above water in places, the 5-fathoms contour line being rather over one cable distant from the shore in places; shoal water extends for nearly half a cable round Pulo Arang Arang, except to the eastward, in which direction there is a shallow bank.

25 **Buoys.**—A white conical buoy, surmounted by a staff and cage, is moored in 3 fathoms on the north-west end of the shallow part of the sand ridge before described, 6 miles from Cape Rachado, and 1½ miles southward of Pulo Arang Arang.

30 A red conical buoy is moored about two-thirds of a cable north-westward of the one-fathom patch.

Two red conical buoys mark the edge of the shallow water extending south-eastward of Pulo Arang Arang, and two similar buoys are moored southward and westward of the end of the pier.

The buoys should not be depended on.

35 **Anchorage.**—Arang Arang affords good anchorage in from 5 to 10 fathoms water during the north-east monsoon, and is said to be not unsafe in the south-west monsoon.

Directions.—Approaching Arang Arang, from either northward or southward, the large shed on the pier is a conspicuous object. Cape
40 Rachado lighthouse should be kept bearing southward of 135° true until the light-beacons, or the lights at night, are in line bearing 58° true, and, these being steered for, will lead over the sand ridge in about 4½ fathoms at low water, and northward of the red buoy marking the one-fathom patch, to the anchorage.

General charts 794, 795, 1355.

Plan of Arang Arang anchorage, 1143.

Tides.—It is high water, full and change, at Arang Arang, at VIIh. approx.; springs rise 10 feet.

Tidal streams.—In the harbour, the flood stream sets to the eastward and the ebb to the westward, but seaward of the sand ridge the streams set across the approach; the flood setting south-eastward from $3\frac{1}{2}$ hours before until $2\frac{1}{2}$ hours after high water by the shore, and the ebb north-westward. 5

Winds.—Sumatras blow home here in October and November. They seldom last more than a few hours, but they raise a little sea; it is, however, not considered dangerous to shipping. 10

Communication.—There is regular steamship communication with Singapore, Malacca, Port Swettenham, and Telok Anson; and by rail with Seremban and thence on main line, &c.; there is telegraphic communication with all parts. 15

Supplies.—Bread, in small quantities, may be obtained at Arang Arang; fresh meat and vegetables can be procured, by rail, from Seremban, and a few fowls and fish from the Malay fishermen; good water is obtainable. The jungle abounds with life—tigers, deer, pigs, monkeys, argus pheasants, and several sorts of pigeons—but it is so dense that little can be done with the gun. 20

Charts 794, 795. Var. $0\frac{3}{4}^{\circ}$ E.

CAPE RACHADO, or Tanjong Tuan is a steep bluff point, covered with trees and easily distinguished, as it is higher than the adjacent coast, and appears when first seen in the distance like an island. There is deep water beyond the distance of a quarter of a mile from it. 25

From Cape Rachado the low woody coast of Sumatra, distant 20 miles, may be seen, the strait being here more contracted than at any other part northward of Malacca. 30

LIGHT.—A light is shown, at an elevation of 388 feet above high water, on Cape Rachado, from a white tower, 78 feet in height, for which see Light list and charts. See view *d* on page 205.

Water.—Near the cape there are two fresh-water wells.

Tidal streams.—Off Cape Rachado the flood sets south-eastward and the ebb north-westward at rates of from 2 to $2\frac{1}{2}$ knots; the south-eastern stream makes from 2 to 3 hours before high water at One-fathom bank and runs for 6 hours. See page 227. 35

Chart 794, Pulo Berhala to Cape Rachado.

ISLANDS and DANGERS near the fairway of Malacca strait:— 40

AROA ISLANDS, a group lying nearly in mid-channel between the Sumatra coast and the North sands, situated north-west-

General charts 794, 795, 1355.

Chart 794, Pulo Berhala to Cape Rachado.

ward of the Klang islands, spread over a space about 9 miles in extent; they are small and situated on a bank with depths of from 6 to 10 fathoms, the northern end of which extends 6 miles north-westward of the islands; the southern joins an extensive mudbank adjacent to the Sumatra coast. Aroa bank is steep-to on the north, east, and west sides, the depths suddenly increasing to 18 and 20 fathoms.

CAUTION.—Much care is requisite in approaching Aroa islands from the northward during the night, as many of them are low and difficult to see after dark, and they lie outside the range of One-fathom bank light.

North rock (*Lat. $2^{\circ} 55' N.$, Long. $100^{\circ} 36' E.$*), the northern islet of the group, is small, about 15 feet high, with a reef extending northward of it.

Pulo Jemur, or Long Aroa, lying nearly 3 miles south-west from North rock, is two-thirds of a mile in length, 2 cables in breadth, flat, and covered with trees, the tops of which are from 80 to 90 feet above high water. Two small islets, 60 and 75 feet high, nearly connected, and having a reef of rocks which extends three-quarters of a mile north-east of them, are situated about 2 cables distance north-east of Pulo Jemur, with shallow water north-west of them.

Malay fishermen sometimes visit Pulo Jemur to fish and procure turtle in the season, and there are some huts and a small spring of fresh water on the island, but not sufficiently large to water a vessel from. In and after the rainy season, or to about the end of the year, a quantity of water may be obtained, there being several natural tanks on the island, but these dry in the hot season; the best watering place is on the western side, which is clear.

Anchorage may be obtained close to the island in 6 or 8 fathoms water, over mud, with the highest part of the island bearing 0° true.

Western Aroa, a group of islets with the tops of the trees from 85 to 90 feet above high water, at three-quarters of a mile westward of Long Aroa, are five in number, namely, Tekong Mas, Pulo Rendang, Pasir Panjang, Labuan Biti, and Tekong Chama, occupying a space of $1\frac{1}{2}$ miles; they are all connected by a reef nearly dry at low water, and extending half a mile north-north-west of them.

Batu Balia, a group of six rocks 3 feet high, surrounded by a circular reef, is half a mile in extent, and lies about 3 miles eastward of Pulo Jemur.

A rock, which dries at half ebb and is steep-to, lies $1\frac{3}{4}$ miles eastward of Batu Balia, between it and Batu Mandi.

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado.

Batu Mandi, or East rock (*Lat. 2° 52' N., Long. 100° 41' E.*), 6 feet high, lies about 7 miles eastward of Pulo Jemur, with depths of 16 to 18 fathoms within a short distance.

Tekong Simbang, or Round Aroa, is 95 feet high to the tops of its trees, precipitous, and the highest of the Aroa group; it may be seen from a distance of 15 miles. There are several rocky islets around it. Tekong Simbang, with its outlying islets, occupy a space of $1\frac{1}{4}$ miles north and south, and three-quarters of a mile east and west; the southern islet, Pulo Tekong, is 30 feet high.

Tides.—From observations extending over a few days in November, 1893, during the north-east monsoon, it was found to be high water at the Aroa islands (Round island) at VIh. approximately; springs rising 14 feet, neaps 9 feet.

Tidal streams.—Off the islands, at springs, the flood stream sets south-east, at the rate of about 2 knots, making from 4 to 5 hours before high water by the shore, and running until one hour to 2 hours after. The ebb sets north-westward about 3 knots. At neaps, the south-east or flood stream being overcome by the prevailing north-west current, was not felt until about 3 hours before high water, ceasing about 2 hours after high water.

NORTH SANDS comprise various sandbanks and spits extending from the Malay coast between Selangor river and Parcelar hill towards the Aroa islands, and westward of the long bank extending north-westward of the Klang islands. The sandbanks have a general north-west and south-east direction, with depths of 6 to 18 fathoms between them. The 5-fathoms north-west extremity of the North sands lies 277° true, distant $19\frac{1}{2}$ miles from Pulo Angsa light, situated northward of the Klang group, and is in lat. 3° 13' N., long. 100° 55' E.

One spot is dry at low water, and there are many others with depths ranging from 4 feet to 3 fathoms, as charted.

Batu Kinching, near the centre of the North sands, has a dry spot about one mile from its southern end. The shallower banks are usually discernible from a short distance during daylight.

Blenheim shoal, having 4 feet least water, is about 2 miles in length, lies 5 miles south-westward of Batu Kinching, and about $10\frac{1}{2}$ miles northward of One-fathom bank lighthouse. For others, see the chart.

Channels.—There is a deep channel between the bank which extends from Pulo Klang and the eastern side of North Sands, but unless it were buoyed it would be dangerous for large vessels to use it, as no bearings can be given to direct them. Coasting vessels use this channel, keeping on the edge of Pulo Klang bank in depths of from 4 to 5 fathoms.

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. $0\frac{3}{4}^{\circ}$ E.

ONE-FATHOM BANK is a detached patch, situated $3\frac{1}{2}$ miles southward of a $3\frac{1}{2}$ -fathoms patch near the south extreme of North Sands; it is one mile in length, within the 3-fathoms contour line, and marks the eastern side of the fairway of Malacca strait; north-eastward and south-westward the bank is steep to, but north-westward the bank extends, with depths of 3 to 5 fathoms, $2\frac{1}{2}$ miles, and south-eastward to about one mile. A bank with $5\frac{1}{2}$ fathoms least water lies 157° true, distant 3 miles from the lighthouse.

The nearest danger on the opposite side of the fairway is a patch of $3\frac{1}{2}$ fathoms, situated at the north-west extreme of the South Sands. There are patches of 7 to 10 fathoms in and near the fairway, but the general depths are from 13 to 20 fathoms.

LIGHT (*Lat. $2^{\circ} 53'$ N., Long. $101^{\circ} 0'$ E.*).—A light is shown, at an elevation of 92 feet above high water, from a grey octagonal tower, with red lantern, on piles, erected about half a mile eastward of the shoalest part of One-fathom bank, for the particulars of which see the Light list and charts. See view of the lighthouse on chart 794 and view *c* on page 205.

Fog signal.—A bell is sounded in thick or foggy weather.

SOUTH SANDS are of similar formation to North Sands, and extend across with but little interruption to the Sumatra coast. The neighbourhood of South Sands may be considered for sailing vessels as the most dangerous part of Malacca strait, there being no near objects from which bearings can be given for vessels working through, to clear the dangers.

Bukit Jugra, 790 feet high, is visible in clear weather along the whole of them, and One-fathom bank light and Cape Rachado light, are in sight from the north-west extreme of the banks, and Pyramid shoal at the north-east extreme, respectively, and will be useful at times.

The eastern edge of South Sands forming the western side of the navigable channel through Malacca strait, and within the 5-fathoms contour line, extends over 50 miles in a south-easterly direction, from the $3\frac{1}{2}$ -fathoms patch south-west of One-fathom bank.

The most dangerous bank bordering the fairway, in addition to the $3\frac{1}{2}$ -fathoms patch just mentioned, is a bank with $1\frac{1}{2}$ feet least water, situated 152° true, distant 15 miles from One-fathom bank lighthouse, and Pyramid shoal; other shallow patches lie mostly within a line joining them.

Pyramid shoal, the north-east or eastern extreme of the South Sands chain, is the more dangerous, as it stands out beyond the others, and when coming from the south-eastward is the nearest to the track of vessels. The shoal is about one mile in length, with one fathom

General chart 1355.

Chart 794, Pulo Berhala to Cape Rachado. Var. $0\frac{3}{4}^{\circ}$ E.

least water, over a bottom of hard sand. Bambek shoal, the nearest danger on the other side of the fairway track, lies about 12 miles north-eastward from it.

Clearing mark.—Rachado light bearing 101° true, or southward of that bearing, leads 2 miles or more northward of Pyramid shoal. 5

Tides.—It is high water, full and change, at One-fathom bank, at Vlh. 15m., springs rise 14 feet, neaps 10 feet.

Tidal streams.—During springs the streams near One-fathom bank, are regular, the flood running south-eastward at rates of from $1\frac{1}{2}$ to $1\frac{3}{4}$ knots, and the ebb north-westward from $2\frac{1}{2}$ to 3 knots, turning very nearly with high and low water. 10

Near the north-west and central part of the South Sands the streams are tide and half tide; one stream setting south-eastward, along the sands, at the rate of $1\frac{1}{4}$ knots, from 3 hours before to 3 hours after high water; and the other stream north-westward, along the sands, at about 2 knots for a similar period. 15

Near the eastern end of South Sands they make one hour earlier, the velocities being about the same. There is an interval of slack water at times, but at others the stream continues running the whole time, gradually changing its direction. It rotates in either direction, possibly dependent on the wind. 20

General directions.—*Continued from page 205.*

Vessels from the northward should make One-fathom bank light-house bearing about 112° true, and steer to pass from 2 to 3 miles southward of it, then keep more to the eastward towards Parcelar point, passing it at the distance of about 6 miles; maintaining this distance off-shore will clear Bambek shoal, as will also Rachado light-house, bearing eastward of 120° true. 25 30

Sailing vessels working to windward should not stand farther off the coast than 10 miles, nor nearer inshore than $3\frac{1}{2}$ miles when between Cape Rachado and Bambek shoal. The depths near the banks are so irregular that they afford no guide as to the proximity of those dangers. 35

At night.—Vessels should keep Rachado light between the bearings of 120° and 103° true, to avoid Bambek and Pyramid shoals.

Chart 795, Cape Rachado to Singapore.

COAST.—**KWALA LINGI** (*Lat. $2^{\circ}23'$ N., Long. $101^{\circ}58'$ E.*) is entered 7 miles to the eastward of Cape Rachado, the coast between being fronted by a mudbank which extends off the high westward of Tanjong Salamat for a distance of $1\frac{1}{4}$ miles. 40

The river is navigable for vessels of 8 or 9 feet draught as far as Sempang (Sepang), about 5 miles from the mouth, and for large

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

boats for 4 or 5 miles beyond. At Sempang there is a police station, and another stands on the south point of the river; a tree (white-washed) marks the north point.

- 5 **Dangers.**—A shoal, with a depth of $2\frac{1}{2}$ fathoms, lies with the south entrance point of the river bearing about 94° true, distant 2 miles.

Beacon.—A rock, situated between the entrance points, covers when there is a depth of 10 feet on the bar; it is marked by a beacon.

- 10 **Batu Mandi** is a rock awash lying $1\frac{1}{2}$ miles south-west of the entrance of Lingi river. It is marked by a beacon.

Batu Tenga are three rocks just above water, lying 2 miles east-south-east from Batu Mandi.

- 15 **Anchorage.**—There is good anchorage off the entrance, in 9 fathoms water, over mud, with Rachado lighthouse bearing 292° true, and the beacon in the river entrance 75° true.

- Directions.**—The river should not be entered without a pilot, who may be procured at Malacca. The bar, with rocks on either side, has a depth of 12 feet at high water, spring tides, and from seaward
20 the course for the entrance is about 50° true, passing about 3 cables off the south-eastern point of the river, 80° true, thence within about 50 yards northward of the rock to the entrance marked by a beacon, as the water shoals rapidly from 7 fathoms to 3 or 4 feet westward of the north point; thence there appears to be no difficulty in proceeding
25 to within half a mile of Sempang, where there is anchorage in 4 fathoms water, with plenty of room to swing.

Boundary.—Sungi Lingi forms the boundary between Negri Sembilan and Malacca.

Tides rise about 9 feet at springs.

- 30 **COAST.**—From Kwala Lingi the coast has a south-east direction for 15 miles to Tanjong Kling, and consists mostly of irregular rocky points with occasional small sandy beaches. The chart shows some named hills which may be useful for fixing position.

- 35 **Pulo Batu Besar or Diana rock** (*Lat. $2^{\circ} 16'$ N., Long. $102^{\circ} 4'$ E.*), 10 feet high, and one mile from the shore, lies about 15 miles south-eastward from Cape Rachado lighthouse. Inshore of Pulo Batu Besar there are several other rocks, some above water; a sandy ridge, with depths of from $3\frac{1}{2}$ to 5 fathoms, lies between a half a mile and $2\frac{1}{2}$ miles north-westward of the rock.

- 40 A shoal head, with a depth of 2 feet, lies $1\frac{1}{4}$ miles, 132° true, from Pulo Batu Besar, and one mile off Tanjong Panchur; several islets and a sunken rock also lie within half a mile of this point.

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

Tanjong Kling, the north-west boundary of Malacca bay, is a low projecting point of land covered with high jungle; there is, or was, a flagstaff on it. Bukit Minyak, 126 feet high, lies about a mile north-west of it.

Shoal.—A coral shoal of small extent, with a depth of 4 feet, and steep-to, lies about 6 cables, 180° true, from Tanjong Kling, and another shoal is said to lie north-westward of it. The point should be given a berth of at least one mile.

FAIRWAY.—**Raleigh shoal** (*Lat. $2^{\circ} 7' N.$, Long. $101^{\circ} 53' E.$*), with a least depth of $3\frac{1}{2}$ fathoms, is about a mile in length in a north-west and south-east direction, and half a mile in breadth within the 5-fathoms contour line, and lies 172° true, distant $17\frac{1}{2}$ miles from Cape Rachado lighthouse, and 10 miles from the coast of Sumatra. The shoal is steep-to on its north-east and south-west sides, but, in a north-west and south-east direction, there are depths under 10 fathoms for a distance of three-quarters of a mile.

Rob Roy bank lies between 12 and 18 miles south-eastward of Raleigh shoal on the western side of the main channel through Malacca strait, and nearly abreast the Water islands; within a depth of 5 fathoms, is about 6 miles in length in a north-west and south-east direction. The shoalest spot near the south-east end (*Lat. $1^{\circ} 54' N.$, Long. $102^{\circ} 5' E.$*) has a depth of one fathom, and lies with Pulo Undan lighthouse bearing 60° true, distant 17 miles.

Shoal heads, with depth of from $1\frac{1}{2}$ to 5 fathoms, extend thence about 5 miles in a north-westerly direction, deepening beyond to 12 fathoms. On the north and south sides the bank is steep-to.

A narrow bank 5 miles in length within the 10-fathoms contour lies 130° true, distant between 6 and 11 miles, from the one-fathom patch on Rob Roy bank. A head near the centre has a depth of $4\frac{1}{2}$ fathoms, and one at the north-west end has 5 fathoms.

Between these banks and Pulo Rupert and Pulo Bengkalis, on the southern shore of the strait, there are numerous shallow banks within the 10-fathoms contour line.

Plan of the approaches to Malacca on 795.

MALACCA.—**Aspect**.—The town of Malacca is built on both sides of the small river of that name, and connected by several bridges; it is the seat of Government of the British settlement of Malacca, and a free port. See Chapter I., page 6.

The population is about 100,000.

On the left bank of the river is St. Paul's hill, surrounded by the remains of an old fort. On the summit of the hill stand the ruins of

General chart 1355.

Plan of the approaches to Malacca on 795. Var. $0\frac{1}{4}^{\circ}$ E.

the ancient church of Our Lady del Monte, also the lighthouse and flagstaff. Around the base of the hill lie the high school, court house, church, hospitals, post office, harbour master's office, and other public buildings.

A little to the south rises St. John's hill, and in the rear of it that of St. Francis; on these eminences are the remains of batteries erected by the Portuguese and Dutch; smaller knolls intervene covered with extensive Chinese cemeteries.

The country a few miles inland is formed of undulating hills, moderately elevated, named Malacca hills, and 20 miles north-eastward of them is Gunong Ledang or Mount Ophir, having a triple peak, 4,182 feet high; the coast and land adjacent to the town are low and wooded.

LIGHT (*Lat. $2^{\circ} 12' N.$, Long. $102^{\circ} 12' E.$*).—A light is shown on the summit of St. Paul's hill, from a square white tower 90 feet in height.

Lloyd's signal station.—There is a Lloyd's signal station at Malacca. It is the property of, and controlled by, the Colonial Government of the Straits Settlements.

Communication.—There is weekly steamship communication with Arang Arang and Singapore, and regularly with the other ports of the Straits Settlements.

A railway runs to Tampin in the State of Negri Sembilan, a distance of 21 miles, where it joins the main line of the Federated Malay States. There is telegraphic communication with all parts. There are good roads with rest-houses, where accommodation may be obtained by applying to the Superintendent of Works, Malacca.

Mails.—See Chapter I., page 5.

Submarine telegraph cables connect Malacca with Penang and Singapore.

Supplies.—Fresh meat, bread, vegetables, poultry, fish, and a variety of fruits may be procured, and water on application to the Harbour master.

Repairs.—Repairs to machinery can be effected.

Hospital.—There is a Government hospital for all classes.

Quarantine.—The station is on Pulo Upeh, and the anchorage on the southern side of that island.

Trade.—The chief exports comprise rubber, rice, copra, tapioca, gambier, areca nuts, hides, rattans, &c.

General chart 1355.

Plan of the approaches to Malacca on 795. Var. $0\frac{1}{4}^{\circ}$ E.

Climate.—The town is fairly healthy; the temperature is a few degrees higher than Singapore.

Malacca river.—Piers.—Lights.—The entrance to Malacca river is between two piers or breakwaters, the channel being dredged to a depth of 5 feet at low water springs. 5

Lights are exhibited at the ends of the piers.

A pier, formerly 1,200 feet in length, now in ruins, is charted eastward of the entrance, from which a light is exhibited at a height of 15 feet. See Light list and charts. 10

The landing place is situated about half a mile up the river, just below the first bridge.

The mudbank fronting the shore extends about a mile off the entrance, with depths of 3 feet to 3 fathoms.

Craft navigating in the river shall keep to that side of the fairway or mid-channel which lies on their starboard side. 15

MALACCA ROAD.—Islets.—Pulo Upeh, situated $2\frac{3}{4}$ miles westward of Malacca town, and $1\frac{1}{4}$ miles from the shore, is about a quarter of a mile in extent, and situated on the 3-fathoms contour of the mudbank which skirts the shore; the islet is about 140 feet high to the tops of the trees. A patch, with a depth of 3 fathoms, lies 170° true, distant about half a mile southward of the east point of the islet. 20

At night, vessels should not approach this islet to a less depth than 12 fathoms. 25

Pulo Java, or Red islet, composed of two islets nearly joined, is about 4 cables in extent, and lies three-quarters of a mile south-east of the river entrance, and on the mudbank.

Beacon.—A stone beacon, painted red, and surmounted by an iron cage, marks a rock, which covers at high water, situated 2 cables southward of Pulo Java. 30

Pulo Panjang, a narrow rocky flat half a mile in extent and covered at high water, lies nearly one mile south-south-eastward from Pulo Java, and about the same distance off-shore; it is steep-to, 4 to 5 fathoms on its south side, but on the inner side the water is shallow. 35

Beacons.—Stone beacons, surmounted by iron cages, mark the east and west extremes of Pulo Panjang; the eastern is painted red, and the western white.

ANCHORAGES.—Malacca road is included in the space lying seaward of a line joining Pulo Upeh and Pulo Panjang, and is a safe anchorage. The best berth is in about 10 to 12 fathoms, with St. Paul's hill lighthouse bearing 43° true, and Pulo Upeh bearing 316° true, about 2 miles off-shore. Under a depth of 10 fathoms the bottom is chiefly mud, but exceeding that depth it is a stiff clay; on 40

General chart 1355.

Plan of the approaches to Malacca on 795. Var. $0\frac{1}{4}^{\circ}$ E.

the east side of the road the bottom is rocky. The 5-fathoms contour line is about $1\frac{1}{2}$ miles off-shore, beyond which the depths increase somewhat quickly to 8 and 10 fathoms.

- 5 Small vessels may lie closer in on the shore flat, with Tanjong Kling seen just within Pulo Upeh, and St. Paul's hill lighthouse about 45° true. The depth here is $2\frac{1}{2}$ fathoms, over mud, at low water, spring tides.

- Small craft, under oars or sail, of less than 20 tons gross tonnage,
10 and boats under sail duly licensed shall, when within port limits between sunset and sunrise, cause to be exhibited either of the lights prescribed by the regulations for preventing collisions at sea, or shall have ready at hand a lantern showing a bright *white* light, which shall be exhibited in the approach of, or when approaching, other vessels, in
15 sufficient time to prevent collision.

The sea-worm in these waters is destructive to vessels or boats not having copper sheathing.

The quarantine anchorage is on the south side of Pulo Upeh, as mentioned on page 230.

- 20 **Explosives anchorages.**—The anchorage for vessels loading or loaded with explosives shall be seaward of a line drawn from Tanjong Kling to Pulo Panjang, and such vessels shall not anchor or berth elsewhere within port limits except with the permission in writing of the Port officer. Vessels carrying, loading, or discharging explosives,
25 shall hoist the International code signal "Flag B" at the masthead, and at night a *red* light in the same place.

- The anchorage for vessels carrying dangerous petroleum (flash point below 73° Fahr.) shall be seaward of a line drawn from Tanjong Kling to Pulo Panjang, and such vessels shall not anchor or berth elsewhere
30 within port limits except with the permission, in writing, of the Port officer.

Articles 20 to 27 of the Port Regulations for Singapore apply to all the ports of the Straits Settlements. See Appendix I., pages 470-474.

- 35 **Directions.**—In approaching Malacca road from seaward, the first objects seen are mentioned with the aspect of the town, page 229.

The road may be safely approached, as there is no sunken danger beyond the mudbank skirting the shore, except the 3-fathoms patch lying half a mile southward of Pulo Upeh.

- 40 A good lookout should be kept for floating fish traps, which at high water sometimes lift their moorings, drift about the anchorage, and are liable to foul the propellers.

By night.—Vessels approaching from the southward at night will make Pulo Undan light, and passing southward of it, and westward of

Plan of the approaches to Malacca on 795. Var. $0\frac{1}{4}^{\circ}$ E.

Pulo Anyut, will then bring the light bearing 135° true, which will lead to the anchorage, with St. Paul's hill light bearing 43° true, as before mentioned. Pulo Undan light will also be seen when approaching the road from the northward, and may be steered for from abreast 5 Tanjong Kling.

Tides.—It is high water, full and change, in Malacca road at VIIh. 30m.; springs rise 11 feet, neaps $8\frac{1}{2}$ feet.

Tidal streams.—The tidal stream sets south-eastward at the rate of $2\frac{1}{2}$ knots from 3 hours before to 3 hours after high water at One-fathom bank; for the remainder of the 12 hours it runs north-westward about $1\frac{3}{4}$ knots. 10

Winds.—Malacca road is neither visited by the cyclones of higher latitudes, nor is it within the influence of the monsoons of the adjacent seas; but during the period of the south-west monsoon sudden hard squalls frequently blow into the road from the Sumatra side in the night, accompanied with lightning, thunder, and rain. These winds, named "Sumatras," generally commence to blow at seven or eight in the evening, and attain their greatest strength at midnight. See page 21. 15 20

COAST.—Between the town of Malacca and Tanjong Segenting, near Mount Formosa, a distance of 45 miles, the coast trends south-eastward, forming two bays; it is low, thickly wooded, and skirted by a mudbank which extends in some places $2\frac{1}{2}$ miles off, and in the bight between Water islands and Muar river to 4 miles from the shore. 25

Boundary.—The Sungai Kesang (*Lat. $2^{\circ} 5' N.$, Long. $102^{\circ} 29' E.$*) is the boundary between Malacca and Johor.

WATER ISLANDS, at about 7 miles south-east of Malacca river, consist of a group of six islands, of moderate height, round, and covered with trees, of which Pulo Undan, the outer island, lies $5\frac{1}{2}$ miles from the shore. Pulo Besar, the largest, is about 250 feet high, and inshore of it the bottom is foul and rocky, but between the others there are depths of from 10 to 20 fathoms. There are said to be wells of good water on Pulo Besar. 30

LIGHT (*Lat. $2^{\circ} 3' N.$, Long. $102^{\circ} 20' E.$*).—A light is shown, at an elevation of 155 feet above high water, on the summit of Pulo Undan, from a square building with a red octagonal tower, for particulars of which see Light list and charts. 35

Dangers.—A flat, with depths of from 2 to 3 fathoms, extends one mile north-westward of Pulo Besar, on which is Pulo Serimbun. 40

A rock, with a depth of 2 feet, is situated westward of Pulo Besar with the western extreme of Pulo Serimbun bearing 76° true, distant

General chart 1355.

Plan of the approaches to Malacca on 795. Var. $0\frac{1}{4}^{\circ}$ E.

$5\frac{1}{2}$ cables. Shoal water and irregular depths exist between this rock and Pulo Besar.

The channel between Pulo Dodol and Pulo Besar has a rock, with
5 $1\frac{1}{2}$ fathoms water, situated about one-third of a mile northward of Dodol.

Plan of Kwala Muar on 1143.

KWALA MUAR (*Lat. $2^{\circ} 3' N.$, Long. $102^{\circ} 33' E.$*) enters the strait at about 15 miles eastward of Water islands; its entrance is
10 narrow, and on account of the shallow flat which extends off its mouth, is only navigable by small vessels. The bar is said to have a low-water depth of 4 feet, but within it is wider and deeper. Vessels of 5 feet draught can ascend the river to Bukit Kepong, some 60 miles up; a very tortuous course to it. Pengkalan police station with flag-
15 staff is charted at about 25 miles from the entrance.

Kwala Muar is the longest in Johor province, and one of its tributaries, the Jempole, is separated from the Sungai Serting by a strip of swampy land only $2\frac{1}{4}$ cables wide. It is therefore easy to drag canoes from one to the other, and as the Serting is a tributary of the Bera
20 which joins the Great Pahang river, canoes can make the passage from Malacca strait to the China sea.

The banks of the river are thickly settled by Chinese gambier and pepper cultivators as far as Bukit Kepong, a large village 60 miles up stream.

25 **Shoals.**—A patch of 3 fathoms lies outside the shore mudbank, from which the light-beacon on the north shore of the entrance bears 83° true, distant $5\frac{3}{4}$ miles; depths of $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms extend about 2 miles west-south-westward, with 10 fathoms close-to. (Chart 795.)

30 **Light-buoy.**—A white light-buoy, exhibiting an *occulting white* light, is moored on the shore flat at 3 miles westward of the north-west angle of Bandar Maharani. (Chart 795.)

Light.—A light is shown from a white iron framework beacon, erected on the northern side of the river entrance, at 6 cables northward of the north-west extreme of Bandar Maharani, for which *see*
35 Light list; when bearing northward of 11° true it is obscured by trees.

Town.—Bandar Maharani, the head-quarters of the State Commissioner, and situated on the east side of entrance to the Kwala Muar, is the second in importance in Johor province; it has a considerable
40 trade, and is plentifully supplied with good water brought in pipes from a reservoir about 12 miles distant. The population is about 5,000.

The country district extending south-eastward towards Bukit Muar, and known as Padang, is a flat alluvial plain about 30 miles in length

General charts 795, 1355.

Plan of Kwala Muar on 1143. Var. $0\frac{1}{4}^{\circ}$ E.

and 10 in breadth, covered with areca-nut palm (betel nut) and cocoa-nut plantations.

Communication.—There is a constant steamship communication with Singapore and Malacca; the district possesses good roads. 5

A light coast railway connects the town with Parit Jawa, about 8 miles south-eastward, and the centre of a very fertile agricultural district.

Trade.—Areca and cocoanuts are exported from Parit Jawa, and pepper, gambier, sago, and tapioca from the river districts; tin mining is carried on in the neighbourhood of Bukit Muar, and a gold mine is worked near Gudong Ledang. 10

Chart 795, Cape Rachado to Singapore.

COAST.—**Bukit Muar**, an isolated thickly wooded hill, about 800 feet high, situated 5 miles south-eastward of Kwala Muar, is visible from Malacca road in clear weather. It is reported to be incorrectly charted. 15

Tanjong Tohor, a low projecting point of land covered with jungle, is 14 miles south-eastward from Kwala Muar, and a useful mark for clearing Formosa bank. 20

Light.—A light is exhibited from a beacon at an elevation of 20 feet, on Tanjong Tohor.

Formosa bank and its north-west extension fronts the shore from between Tanjong Tohor, to about 4 miles south-eastward of Tanjong Segenting, at about 2 miles seaward of these points, and covering the approach to Sungai Batu Pahat, within the 5-fathoms contour line; it is $7\frac{1}{2}$ miles in length in a north-west and south-east direction, 3 cables in breadth, with depths of from 2 to $4\frac{1}{2}$ fathoms, over hard black sand. The east end of the shallow part of the bank ($3\frac{1}{2}$ fathoms) lies with Pulo Sheilo light-tower bearing 40° true, distant $3\frac{1}{2}$ miles. A ridge with depths of from 6 to 9 fathoms extends $7\frac{1}{2}$ miles north-west of the 3-fathoms contour. The bottom is irregular seaward of the bank, with patches ranging from $6\frac{1}{2}$ to 10 fathoms, with depths of 14 to 20 fathoms around them. 25 30

SUNGI BATU PAHAT, or **Formosa river** (Lat. $1^{\circ} 49' N.$, Long. $102^{\circ} 54' E.$) is fronted by a shallow flat, extending 3 miles off, with only a depth of one foot at low water near the entrance. The 3-fathoms edge extends 2 miles westward of Pulo on the east side of the approach. Within the entrance there is deeper water, and it is probably navigable for light-draught vessels or boats for many miles; at 6 miles up it bifurcates, the western branch being named Sempang Kiri, and eastern Sempang Kanan, or Sembrong. 35 40

General chart 1355.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

The eastern branch, which changes its name several times as the river is ascended, takes its rise in a swamp, close to the source of the Sungai Sembrong Endau, which discharges into the China sea. The settlements of Pengkalan Tong Kawalak and Pengkalan Stumpat are on this branch about 14 to 16 miles from the sea, respectively. The Chinese gambier and pepper cultivators are settled in large numbers on the several tributaries of the river.

Gunong Banang, or Mount Formosa (*Lat. $1^{\circ} 49' N.$, Long. $102^{\circ} 56' E.$*), 1,422 feet high, is the summit of a range of undulating hills, which terminate at Tanjong Segenting, east side of the approach to the river.

Pulo Sheilo (Sialu) lies about a cable distance off the point situated three-quarters of a mile north-west of Tanjong Segenting.

Light.—A light is shown from a grey masonry tower erected on the centre of Pulo Sheilo, elevated 40 feet. *See Light list.*

Beacon.—A white obelisk is erected on Tanjong Segenting, south side of the entrance to the river (not charted).

Tides.—It is high water, full and change, at the entrance, at VIIIh. 30m.; springs rise 11 feet, neaps $8\frac{1}{2}$ feet.

Coast.—From Tanjong Segenting to Tanjong Bulus, a distance of about 47 miles, the coast is low and thickly wooded, and abreast Pulo Pisang recedes about 3 miles; it is fronted by a shallow mudbank to distances of from one mile to 2 miles, to nearly abreast Pulo Pisang, and which is 7 miles off-shore; here the 3-fathoms edge extends nearly off to that island, gradually reducing its distance south-eastward, extending only about $1\frac{1}{4}$ miles off Tanjong Bulus. Several creeks empty themselves into the sea in this tract of coast. Within a line joining Tanjong Segenting and Pulo Pisang, the bottom is uneven, there being patches of 3 to 4 fathoms, with 6 to 8 fathoms close-to; vessels therefore should keep seaward of the line.

SINGAPORE STRAIT.—Western entrance.—The entrance to Singapore strait from the westward lies between Tanjong Bulus on the north and Little Karimun island, with Pulo Hiju or the Brothers, north-west of it, on the south. The navigable channel, or fairway, is 7 miles wide, with depths of 15 to 22 fathoms, sand and mud bottom. The approach is between Fair channel bank and Pulo Pisang on the north, and Long bank on the south, with deep water.

PULO PISANG (*Lat. $1^{\circ} 28' N.$, Long. $103^{\circ} 15' E.$*), 340 feet high, one mile in length, in an east and west direction, and covered with trees, lies 7 miles off the shore of the bight abreast it, and 19 miles north-westward of Tanjong Bulus, north side of entrance to Singapore strait; it may be seen from a considerable distance in clear weather.

General charts 1355, 3543.

Chart 795, Cape Rachado to Singapore. Var. $0\frac{1}{4}^{\circ}$ E.

A spit about half a mile wide, steep-to, and with 3 feet water near its extreme, extends 5 miles, 144° true, from Pulo Pisang; and a bank having depths of 3 to 4 fathoms extends 5 miles north-west of the island. Pulo Sauk, a small islet, 220 feet high, lies close eastward of Pulo Pisang, on the same bank. 5

LIGHT (*Lat. $1^{\circ} 28' N.$, Long. $103^{\circ} 15' E.$*).—A light is shown, at an elevation of 510 feet above high water, from a red circular tower, 40 feet in height, with a white lantern, erected on the summit of Pulo Pisang, for details of which see Light list and charts. 10

BANKS bordering the fairway.—**Fair channel bank**, a long and narrow bank stretching nearly the whole distance between Formosa bank and Pulo Pisang, or over a distance of 20 miles, is steep-to, and has general depths of from 6 to 8 fathoms; the least known depth is $4\frac{1}{2}$ fathoms, on two patches 2 cables apart, east and west, and situated about 268° true, distant about 7 miles from Pulo Pisang lighthouse. 15

Less water may exist in this vicinity.

Long bank, on the southern side of the fairway, is of a similar character but shallower, and lies parallel to Fair channel bank, at about 7 miles distant. 20

The western extreme of the shallow portion, which has depths of from $2\frac{3}{4}$ to 5 fathoms over a distance of about 21 miles, lies $15\frac{1}{2}$ miles, 190° true, from Tanjong Segenting. It is steep-to on its north and south sides. 25

A patch of $6\frac{1}{2}$ fathoms is charted on the north-eastern side of Long bank, at $8\frac{1}{2}$ miles, 230° true, from Pulo Pisang light, or about $5\frac{1}{2}$ miles southward of the $4\frac{1}{2}$ -fathoms patches on the southern part of Fair channel bank, mentioned above. The fairway of the strait is between them. 30

South-westward of Long bank are numerous similar banks parallel to it, extending to within a short distance of the banks fringing the Sumatra side of the strait. It would be perplexing to the seaman to give any further description of these banks; the best idea of them is to be gained by studying the chart. 35

Chart 2403, Singapore strait.

Pulo Kokob (Kukub) is a low flat wooded island about 2 miles in extent, lying within the edge of the mudbank fronting the shore, at 6 miles north-westward of Tanjong Bulus, and separated from the coast by a narrow passage shallow in both approaches. The trees on 40

General charts 795, 1355, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{4}^{\circ}$ E.

the north-west side of the island are of a bright green colour, and at the south-east end they are tall trees, like those on the adjoining coast.

- 5 **Tanjong Bulus (Piai)** (*Lat. $1^{\circ} 16' N.$, Long. $130^{\circ} 30' E.$*), the south point of the Malay peninsula, is a broad tongue of low land having high trees on its western side and low bright green mangroves on the eastern side. All the adjacent country is low with the exception of Gunong Pulai, an isolated mountain, 2,141 feet high, situated
10 20 miles northward of the point. *See view e on page 205.*

The mudbank, drying at low water to the distance of $1\frac{1}{4}$ miles, southward of the point, is steep-to.

Tides.—It is high water, full and change, at Tanjong Bulus, at IXh. 30m.; springs rise $10\frac{1}{2}$ feet, neaps $6\frac{1}{2}$ feet.

- 15 **Tidal streams.**—The east-going stream runs from 2 to 3 hours before, to 2 to 3 hours after, high water.

Caution.—In passing Tanjong Bulus and Pulo Kokob, caution must be exercised, as the east-going stream sets strongly towards the shore bank, and the west-going stream towards Long bank, on the
20 opposite side of the fairway.

- The Brothers**, named Pulo Hiju Besar and Pulo Hiju Kechil, are two round islets, each about 153 feet high, lying $2\frac{1}{2}$ miles to the north-westward of Little Karimun, south side of approach to Singapore strait; a rock dries at low water at $1\frac{1}{2}$ cables, 292° true, from the
25 eastern islet. Pulo Nangoi, or the South Brother, 128 feet high, lies $1\frac{1}{10}$ miles westward of the Little Karimun, and is mentioned with that island.

- Dangers.**—A rock with a depth of 4 feet lies 44° true, distant $2\frac{1}{2}$ cables from Hiju Kechil. A rock with $1\frac{1}{2}$ fathoms, 0° true, distant
30 3 cables from the same islet.

A rock, awash at low water, lies 309° true, distant $2\frac{1}{2}$ cables from the islet. A rock with a depth of $3\frac{1}{2}$ fathoms lies 177° true, distant 3 cables from the islet. All these are steep-to.

- LIGHT** (*Lat. $1^{\circ} 11' N.$, Long. $103^{\circ} 21' E.$*).—A light is shown at
35 an elevation of 131 feet, on Pulo Hiju Kechil, from a white iron framework structure, 44 feet in height, for details of which *see* Light list and charts. The keeper's dwelling, a white building with red tiles, stands below it.

- NOTE.**—Electric lights are exhibited from a rubber factory on
40 the north point of Great Karimun island, which are conspicuous at times.

General charts 795, 1355, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{4}^{\circ}$ E.

The Karimun islands are described with the east coast of Sumatra, page 141. Little Karimun, 1,090 feet high, and Great Karimun, 1,480 feet high, southward of it, are prominent objects when approaching Singapore strait from either direction. 5

Durian strait, the northern entrance of which lies eastward and southward of the islands, is described in Vol. II.

General charts 795, 1355, 3543.

CHAPTER VI.

SINGAPORE STRAIT, INCLUDING SINGAPORE ISLAND AND ROAD,
KEPPEL HARBOUR, AND OLD STRAIT OF SINGAPORE.

VARIATION.—Decreasing 3 minutes annually.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

GENERAL DESCRIPTION.—Singapore strait is bounded on the north by the Malay peninsula and Singapore island, and on the south by the Bulang archipelago, Pulo Batam and Pulo Bintang, two large islands. The entire length of the strait is about 60 miles, and its breadth, at the western entrance, about 10 miles; at the eastern entrance it is about 20 miles wide, but southward of Singapore, between St. John islands and Batu Beranti, it is only $2\frac{1}{2}$ miles wide, but the fairway is deep throughout.

Its navigation was formerly attended with much difficulty and anxiety, but such has ceased to be the case since the erection of Raffles lighthouse upon Coney island, Horsburgh lighthouse on Pedra Branca, Sultan shoal lighthouse, and other lights and beacons. With common attention the strait can now be navigated either by day or by night.

Order in describing.—For the sake of convenient reference it has been considered desirable in describing this strait to divide it into four portions, viz., Singapore strait, western part; Keppel harbour; Singapore town and road; Singapore strait, eastern part; and Old strait of Singapore.

Pilots for Singapore are usually to be found near Sultan shoal. If none are there at daylight in their steam launches in the track of vessels off Sultan shoal, the signal station on Mount Faber will always repeat the signal for a pilot, and one will go out; but pilotage is not compulsory.

The pilot boats are painted white; have the word "Pilot" painted on each bow, and marked in black on the sail, if such is carried; they also show a red and white flag (horizontal, upper half white) with letter P, in blue, in the centre.

Pilotage waters include the area lying within lines drawn from the obelisk on Tanjong Katong to the obelisk on Peak island; from the

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

latter to the south-east extremes of St. John's island; from thence to Sultan shoal lighthouse, and thence to the north-east extreme of Cyrene shoal, produced to meet Singapore island.

Pilots will always be found at the Pilots' Club in Keppel Harbour. 5

Pilotage dues.—The following dues are to be charged by pilots under Section 375 of the Merchant Shipping Ordinance of the Straits Settlements:—

	Per foot draught of water.		
1. Inwards or outwards, or to or from any berth or anchorage within pilotage limits not specified below	\$	c.	10
2. To or from any berth in Keppel harbour (Sinki channel excepted)	1	35	
3. To or from the Smelting works wharf, Sinki channel	1	60	
4. To or from Pulau Bukum wharf	1	50	
5. From one part of Keppel harbour to another, including shifting berth (Sinki channel excepted) ...	1	0	15
6. Sultan shoal to Cyrene shoal, and vice versâ, an additional charge of	0	35	
7. Sailing vessels (including vessels not under steam), which being towed, an additional charge of	0	25	20
8. Detention per hour completed	5	0	
9. Night fee, entering or leaving Keppel harbour between 6-30 p.m. and 5 a.m.	25	0	
10. If called to Pulau Bukum and not required	20	0	
11. Minimum charge for any one pilotage	10	0	25

A fraction of a foot to count as one foot.

Note.—The maximum charge (exclusive of fees in items 6 to 9) for any single pilotage service shall not exceed \$1.60 per foot draught.

Coaling signals.—Vessels requiring coal should hoist the Commercial code rendezvous flag at the dip, when a similar flag will be waved from the wharf in Keppel harbour, to which the vessel can go alongside. 30

The Singapore Harbour Board's wharves are divided into sections, numbered from 1 to 9 from the eastward, and large black figures are hoisted at the yardarms of the Pilots' Club flagstaff, indicating the number of the wharf allotted to the vessel denoted. 35

When a vessel is entering the harbour from the westward, the number of the wharf assigned will be hoisted at the north yardarm; if entering from the eastward, from the south yardarm; when more vessels than one are entering, from either direction, numbers are added below the upper number, and correspond to the order in which the vessels enter, *i.e.*, the vessel ahead follows the direction given by the upper number, and so on. When the channel is not clear for a vessel 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

to go alongside, a black ball is hoisted at either yardarm in place of a number, its position denoting the vessel signalled, which must remain outside until the number of the wharf is made.

- 5 An anchor hoisted at either yardarm denotes, by its position, that the vessel indicated should anchor outside, no wharf accommodation being available at the time. *See the Wharves, page 264.*

SINGAPORE STRAIT.—WESTERN PART.

- SOUTH SHORE.**—The Karimun islands, south side of the west approach to Singapore strait, have been described with the southern or Sumatra side of Malacca strait. Eastward of these islands, between them and Tree island, described below, is the northern entrance to Durian strait, described in Vol. II.

- Tree island** (*Lat. $1^{\circ} 8\frac{1}{2}'$ N., Long. $103^{\circ} 40'$ E.*), or Pulo Angup, is the north-western of a chain of islands, extending about 5 miles in a north-west and south-east direction, and forming the southern side of Singapore Main strait.

It is formed by a coral reef, 9 cables long in a north-west and south-east direction, and a quarter of a mile broad, having a sandbank extending along the north-eastern side.

- 20 At high water the reef covers, except a small part of the southern end of the sandbank, upon which are a few small straggling trees.

A hut is occasionally erected by fishermen.

- LIGHT.**—A light is shown, at 36 feet above high water, from a white iron framework, erected on the northern end of Tree island.

25 *See Light list.*

Shoal.—A shoal, with $5\frac{3}{4}$ fathoms least water, is situated $1\frac{1}{10}$ miles north-north-eastward of Tree island lighthouse.

- To pass in the fairway northward of this shoal and southward of the shoals situated south-westward of Alligator island, Raffles light should be kept between the bearings of 102° and 97° true.

- Kent rocks**, between Tree and Red islet reefs, lie in a north-west and south-east direction from each other, about 4 cables apart, steep-to, and their positions are usually marked by tidal rips. From the southern rock, which is the larger of the two, and has a depth of $1\frac{1}{4}$ fathoms the centre of Red island is in line with the east extreme of Long island, bearing 125° true, the former island distant $1\frac{1}{2}$ miles. The northern rock is about 5 yards in length, with a depth of 4 feet.

- Red islet, or Pulo Pelampong**, low, sandy, and 20 feet high, situated $2\frac{3}{4}$ miles south-eastward of Tree island, is about 130 yards long and 70 yards broad; it is of a peculiar red colour, with

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

a few trees upon it, rising to a height of 38 feet. Several fishermen's huts are situated on this island.

Reefs.—The reef surrounding Red islet extends 4 cables to the north-westward with a breadth of a quarter of a mile. 5

Five small reefs, which uncover from 2 to 3 feet, are situated south-westward of the islet at distances of from half a mile to $1\frac{1}{2}$ miles, with shallow water beyond, as charted.

Long island, or Tekong Besar, is 87 feet high to the tops of the trees. The rock off the north end is 4 feet high, and a small detached reef is situated one cable south-westward of the south-west edge of the surrounding reef. 10

Between Red islet and Long island is a channel used by small local steam vessels.

Round island, or Tekong Kechil, 82 feet high, to the tops of the trees, is small, thickly overgrown, and lies half a mile south-east of Long island. 15

Reefs.—The reef surrounding this island is narrow on the eastern side, but 2 cables broad on the western side.

A small detached reef, on which is the light, is situated one cable from the shore reef on the southern side, and two detached reefs lie northward and north-eastward from the island at 2 cables distant; the eastern of these is a quarter of a mile in extent. 20

LIGHT.—A light is shown, at 32 feet above high water, from a white iron framework, erected on the detached reef situated on the southern side of Round island. See Light list. 25

PHILLIP CHANNEL lies between Long and Round islands to the north-westward, and the numerous islands fronting Batam and Bulang islands to the south-eastward. It is 3 miles wide, free from danger, with good anchorage, and is a short route for vessels proceeding to or from Singapore, through Durian strait. 30

Steep cape, or Cherni point, the north-west point of Kepala Jerni island, is 221 feet high, precipitous, and remarkable; it forms the south-east side of Phillip channel.

Islets and rocks extend south-westward of Steep cape to Jangkat island, encumbering the northern entrance to Chombol strait. 35

Cap islet, or Chula, in the southern approach to Phillip channel, $3\frac{1}{2}$ miles southward of Round island lighthouse, is a bare rock of a yellowish colour 40 feet high, with a flat top and perpendicular sides; it is surrounded by a reef to the distance of about $1\frac{1}{2}$ cables, with depths of 4 to 5 fathoms at 3 cables off the islet. Vessels should not pass between it and Steep cape. 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

Mid-channel reef, situated in the fairway between Cap islet and Steep cape, the north-west extreme of Kapala Jerni, is 6 cables in length in a north and south direction, $1\frac{1}{2}$ cables in breadth, with a
5 depth of 12 fathoms midway between it and Cap islet.

A reef which dries lies between it and Steep cape.

Ganymede, the largest of the north-western islands of Bulan archipelago, and forming the eastern side of Phillip channel, is about 2 miles in length and fully half a mile in breadth; it is composed of a
10 number of moderately elevated hills, the greatest elevation being 219 feet high. Several rocks above water lie on the reef which encircles the island to a distance of 2 to $3\frac{1}{2}$ cables; a wooded rock lies close to its northern extreme.

Little Ganymedes, two small islets situated half a mile westward of Ganymede, are connected with it by reefs; a detached reef half a mile in length lies westward of the two islets. The northern islet and larger is fringed with mangroves, above which is a bare conical hill, 95 feet high.

Reefs.—A reef, about 2 cables in extent, which dries, is situated
20 $1\frac{1}{10}$ miles southward of the southern Little Ganymedes islet, with another midway between; another lies half a mile off the north-east extreme of Kapala Jerni.

Eastward of these reefs lie Pulo Ampar, with Kera islet on the west extreme of its reef, and a rock which dries 6 cables farther westward. A great number of islets and rocks lie north-eastward of these,
25 for which *see* the chart.

MAIN STRAIT.—**Helen Mar reef** (*Lat. $1^{\circ} 7\frac{1}{2}'$ N., Long. $103^{\circ} 46\frac{1}{2}'$ E.*) is the outer and north-westernmost of the dangers which lie off the north-west end of Pulo Bulan, and the turning point
30 from Phillip channel into Singapore Main strait for vessels bound eastward. It consists of two patches one cable apart, the outer drying 2 feet and the inner 7 feet; both are steep-to, and within the 10-fathoms contour line. It lies with Raffles lighthouse seen just within the left extreme of Alligator island bearing 318° true, the
35 lighthouse distant nearly 3 miles, with the Main strait between them.

Gunong Jantan, the south peak of Great Karimun, in line with Red islet, bearing 266° true, leads about 4 cables northward of Helen Mar reef; and Steep cape bearing 190° true, the same distance westward of it.

A coral patch with one fathom water lies $3\frac{3}{4}$ cables, 169° true, from Helen Mar reef, and there are reefs which dry between it and Ganymede island.

At $1\frac{1}{4}$ miles, 86° true, from Helen Mar reef is a patch of 2 fathoms.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

Pulo Nérup.—Within, and southward of, Barren islet, is Pulo Nérup (having a flat hill 170 feet high). Eastward of Pulo Nérup are the Besar islets, from 43 to 117 feet high, and farther north-eastward is Blakang Padang, and other islands. 5

A flat with depths under 2 fathoms extends 7 cables westward of Pulo Nérup.

The drying reef, northward of Pulo Nérup, extends to a distance of 2 cables.

Barren islet, or Subar, is a mere rock 60 feet high, situated just northward of the Kapal group, and within the 10-fathoms contour line fronting the above islands. 10

Buffalo rock or Token, 5 feet high, with a patch which dries 2 feet at half a cable southward of it, lies $1\frac{1}{4}$ miles north-westward of Barren islet, well out towards the fairway of Main strait; it is about 30 feet in length, with depths of from 12 to 14 fathoms within a short distance, and lies with Raffles lighthouse bearing 273° true, distant $4\frac{1}{2}$ miles. 15

Pulo Telup and Pulo Senáng lie about half a mile off the west coast of Pulo Blakang Padang, encircled by the same reef. 20

Two small patches, awash at low water, with a depth of 7 fathoms close to, lie about half a mile off the west side of Pulo Telup.

Pulo Blakang Padang, the largest of the islands on the southern side of the Main strait, and fronting the entrance to Bulan strait, is generally low, covered with jungle, about $1\frac{1}{2}$ miles in diameter, and encircled by a reef, which projects nearly half a mile in places; it is separated from the Sambu islands eastward of them by a channel half a mile in breadth, in which the depths are from 8 to 15 fathoms. 25

Beacon.—See Buoyage, page 247.

Quarantine.—A Dutch quarantine establishment has been erected on Blakang Padang, and a pier constructed. 30

Two mooring buoys lie off the station.

Mariám island is an islet 2 cables southward of Pulo Sambu. In the fairway between Mariám island and Tanjong Pingi are three patches dry at low water, and some foul ground. 35

Buoys.—See page 247.

Pulo Sambu, 207 feet high, and the larger of two islands which form the western limit of Batam bay, is nearly a mile in length, a quarter of a mile in breadth, and fringed by reef.

The island is used for storing petroleum brought from Borneo. There are a number of white petroleum tanks, which are conspicuous when approaching from the westward; some are on the summit, and can 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

be seen from the northward and eastward. A flagstaff is erected about 200 yards north-eastward of the jetties, on the western side of the island.

- 5 **Jetties.**—There are two jetties on the south-west side of Pulo Sambu for discharging petroleum; the northern has a depth of 30 feet, and the southern a depth of 26 feet alongside at low water, spring tides.

- Water** is plentiful on Pulo Blakang Padang and Pulo Sambu;
10 a reservoir has been built on the latter.

Telephone cable.—A submarine telephone cable is laid from the north-east side of Pulo Sambu to Tanjong Katong, eastward of Singapore.

- Pilot station and signals.**—A Dutch pilot station has been
15 established on Pulo Sambu, and the following signals are shown for vessels requiring a pilot for or in the Rhio archipelago:—

- From the vessel.—By day: Flags P.T., International code, Pilot Jack or the vessel's national flag at the fore. By night: A blue light every fifteen minutes, or a white light shown over the stern at short
20 or frequent intervals for about a minute at a time.

The above should be made until answered from the station as follows, or until the pilot is on board:—

From the station.—By day: A ball at the signal masthead. By night: A red light at the signal masthead, and a rocket fired.

- 25 If a vessel is permitted to enter without a pilot, a cone, point upwards, will be hoisted at the signal masthead during the day, or two rockets fired in succession at night time.

A vessel carrying mails should hoist two flags of the nation to which she belongs at the fore, one below the other.

- 30 Pilots are forbidden to proceed during thick or foggy weather, when navigational marks are not visible.

- Little Sambu island** (*Lat. $1^{\circ} 10' N.$, Long. $103^{\circ} 53' E.$*), about 3 cables in length, lies about a quarter of a mile north-north-westward of Pulo Sambu, and is fringed with coral. Sambu ledge extends about
35 half a mile north-west of the island, with depths of one to 2 fathoms, nearly to Batu Beranti; it has a rock above water near its centre.

Batu Beranti, two rocky ledges, about $2\frac{1}{2}$ cables apart, the centres of which are above water, lies 8 cables distant from Little Sambu.

- 40 The western one, on which there is a light, lies 333° true from the island; a patch of 5 fathoms lies 2 cables northward of it; steep to beyond.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

The depths near these dangers are deep and irregular, affording no reliable guide for a vessel approaching them.

A bank about $2\frac{1}{2}$ miles in length lies eastward of Batu Beranti light, with depths varying from 6 to 10 fathoms, as charted. 5

Eddies and overfalls.—Owing to the strong tidal streams which prevail in this part of the strait, and the rocky and uneven nature of the bottom, violent eddies and overfalls are usually to be met with; it is therefore advisable to keep on the north side of the strait. 10

Light (*Lat. $1^{\circ} 11' N.$, Long. $103^{\circ} 53' E.$*).—A light is shown from a beacon, 43 feet high, erected on the western Batu Beranti.

ENTRANCES to Bulan strait.—Between the Sambu islands and Blakang Padang is a channel about 4 cables wide with depths of 9 to 12 fathoms as far in as Mariám islet. 15

Beacons and buoys.—On the western side of the channel, on the edge of the reef extending from the island northward of Blakang Padang, is a round iron pile beacon, surmounted by a white ball. Within this beacon, white conical buoys mark the edge of the reef off Blakang Padang. On the eastern side are the Sambu jetties, where vessels load and discharge, before mentioned. 20

Southward of Sambu is Mariám island fringed by a narrow reef, and lying in the fairway.

A beacon, with white ball, marks the south edge of the reef extending southward of Sambu; a beacon, with black truncated cone, marks the north edge of the reef extending northward of Mariám island. 25

A black buoy with staff and truncated cone is charted about 2 cables westward of the islet, with a patch of $2\frac{1}{2}$ fathoms at about 2 cables south-west of it, and with reefs between that patch and Blakang Padang. 30

At about 2 cables distance south-eastward of Mariám is a similar buoy marking the north-western extreme of the several detached reefs extending from Tanjong Pingi.

The fairway is westward of it when entering from Batam bay. For Bulan strait, *see* Vol. II. 35

NORTH SHORE of Singapore strait; western approach.—Between Tanjong Bulus and Tanjong Gul, the south-west extreme of Singapore island, a distance of 9 miles, lies the west entrance of the Old strait or Selat Tebrau, fronted by a bank with depths under 3 fathoms to beyond a line joining them. (Old strait is described on page 300.) 40

Anchorage.—During the north-east monsoon good anchorage may be obtained about three-quarters of a mile south of this bank in from 9 to 10 fathoms water, with Tanjong Bulus bearing 278° true, distant 3 miles. 45

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

SELAT SEMBULAN is a channel about 4 cables wide leading from the westward or from Old strait, to the western entrance of Keppel harbour, a distance of about 9 miles. The fairway depth is not under 6 fathoms, but it is only suitable for small craft. It lies between the south-western coast of Singapore island on the north, and the group of islands which separates it from Selat Sinki on the south.

Northern shore.—From Tanjong Gul, the north-west point of the entrance, the coast eastward to Sungi Pandan, a distance of $5\frac{1}{2}$ miles, consists of mangrove swamps, backed by hills from about 160 to 340 feet in height, and fronted by reefs on which are the islets of Pulo Sembilan, 80 feet high, Pulo Kling, Pulo Damar Laut, Tanjong Balat, and Tanjong Penjuru. On either side of the latter lie the Sungi Jurong and Sungi Pandan, two streams of no importance, being gutters in the swamps.

Eastward of these small streams, the coast trends south-eastward for about 4 miles to Tanjong Blayer. The first mile is fronted by mangrove, but the remainder is solid ground. At about midway it is backed by a ridge of grassy hills, from 140 to 270 feet high, near the northernmost peak of which is a conspicuous tree. A conspicuous white house is situated at about one mile northward of the entrance to Keppel harbour, another on the slope of the hill $2\frac{3}{4}$ cables north-west of Mount Faber flagstaff.

The coast is fronted by sandbanks nearly dry at low water in places, to a distance of nearly a mile, or to within a distance of 6 to 7 cables of Pulo Seburus Luar on the opposite side of the strait.

Southern shore.—The islets Pulo Pesek, 60 feet high, Ayer Limau, 114 feet high, with rocks eastward of it, Pulo Serayu, 122 feet, and Pulo Seburus Luar, the easternmost islet of the group, form the southern side of the strait; Pulo Ayer Chawan, 111 feet high, is the central and largest island of the group. The other islets are mentioned with Selat Sinki; there are boat channels between them, as charted.

Dangers.—Beacons.—Off Tanjong Gul, north side of the entrance, is a bank $1\frac{1}{2}$ miles in length, within a depth of 3 fathoms, with a least depth of 2 fathoms near its centre, situated 230° true, distant three-quarters of a mile from Tanjong Gul. Eastward of Tanjong Gul, about 9 cables, is a small reef which dries at 2 cables off the shore reef, with Pulo Pesek bearing 150° true, distant about 9 cables; it is marked by a white pipe beacon surmounted by a drum.

The reef half a mile in extent close south-westward of Pulo Pesek, south side of the strait, is marked by a red stone beacon, with staff and disc, on its western extreme, numbered 23. A patch with less than 6 feet water lies $1\frac{1}{2}$ cables south-westward of the beacon. Patches

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

with depths of $3\frac{3}{4}$ fathoms to $4\frac{3}{4}$ fathoms extend about one mile south-west of the beacon.

A rock, nearly awash at low water, lies 4 cables, 63° true, from Pulo Pesek. There are no other dangers outside the 5-fathoms contour line. 5

Directions.—There is no difficulty in small craft navigating this strait, when proceeding to Old strait; for others Selat Sinki should be taken.

Plan of Selat Sinki on 2403.

10

SELAT SINKI, the deep-water channel by which Keppel harbour is approached from Malacca strait is bounded on either side by islands and reefs. Between Sultan shoal and Cyrene shoal it is about 7 miles in length, east and west, and at its eastern and narrowest part south of the latter it is about 9 cables broad, with irregular depths of from 9 to 16 fathoms. The mail steamers both to and from Europe now use Selat Sinki, as being the direct route, and the beacons are well maintained, those on the starboard hand on entering are red, and and on the port hand white, with topmarks, below described. The channel is available at all times for all classes of vessels, but night navigation requires some local knowledge. 15 20

Sultan shoal, or Trumbu Karimun, situated on the north side of the west entrance to Selat Sinki, is circular, about two-thirds of a cable in diameter, with rocks which dry about 2 feet at low-water, spring tides. Close to the westward of the shoal are depths of 3 and 4 fathoms, but the east side is steep-to, there being 6 fathoms near the rocks. 25

LIGHT (*Lat. $1^{\circ} 14' N.$, Long. $103^{\circ} 39' E.$*).—A light is shown, at a height of 60 feet, from a light-tower, above a two-storied dwelling, on Sultan shoal; for details, see Light list and charts. 30

Anchorage.—Vessels from the westward arriving off Sultan shoal at night, and waiting for daylight, may anchor in 11 or 12 fathoms about one mile north of the shoal. They should not anchor at a greater distance than 2 miles north of the lighthouse, as several submarine telegraph cables are laid to the northward. 35

Bank.—A depth of 7 fathoms has been found (1914) at a distance of $2\frac{1}{10}$ miles, 265° true, from Sultan shoal light. It has not been examined, and less water may exist.

Ajax shoal, situated 125° true, distant one mile, from Sultan shoal, is one cable in extent and composed of coral with sharp pinnacles, and has a least depth of 3 fathoms. The water deepens gradually north-westward of the shoal; but the channel side is steep-to. 40

General charts 2757, 3543.

Plan of Selat Sinki on 2403. Var. $0\frac{1}{2}^{\circ}$ E.

Buoy.—A red conical buoy, with ball, marks the north-east side of the shoal.

North shore.—Islets and reefs.—Beacons.—The northern shore of the strait is formed by the southern islands of the group which lie between it and Selat Sembulan. Pulo Sakra Laut, the westernmost, is 103 feet high, and about half a mile in extent; all of these are surrounded by mangroves, and there are shoals and channels between them, as charted.

A reef, which dries 2 feet, lies about one mile, 256° true, from the west extreme of Sakra Laut; and a patch of $5\frac{1}{4}$ fathoms at 5 cables south-west of this reef.

Pulo Laut Bakan is a low mangrove island, situated on the east part of a reef one mile in extent, close southward of Sakra Laut reef.

A reef of small extent, which dries from 2 to 3 feet, lies 3 cables southward of the reef. It is marked by No. 2 beacon, white, with white staff and disc. A rock, with less than 6 feet water, lies one cable eastward of Laut Bakan reef.

Pulo Ayer Merbau, 98 feet high to the tops of the trees, lies eastward of Laut Bakan; between it and Pulo Ayer Chawan, before mentioned, are two other islets surrounded by mangroves and reef. The south extreme of Ayer Merbau is a red bluff, 39 feet high, and conspicuous

Reef.—A small patch, which nearly dries at low water, lies 84° true, distant $4\frac{1}{2}$ cables from the red bluff, and midway between it and the bluff is a similar but larger patch; both are steep-to.

Eastward of Pulo Ayer Merbau is Pulo Seburus Luar, 65 feet high, and the easternmost of the group; between and northward are three mangrove islets fringed with reef and out of the track, with channels between them, as charted.

Cyrene reefs lie in the fairway, but the direct channel is southward of them. They are about a mile in extent, consisting of four patches partly dry at low water, with deep water between them. White beacons, with staff and disc, Nos. 4 and 6, mark the south and south-east extremes of these patches.

Light-buoy.—A light-buoy, exhibiting a *white occulting* light, is moored in about 10 fathoms, southward of No. 6 beacon.

The bottom is irregular between Cyrene reefs and the entrance to Keppel harbour; the least known depth is $6\frac{1}{2}$ fathoms, situated $1\frac{3}{10}$ miles, 78° true, from No. 6 beacon.

South shore.—Reefs.—Beacons.—The southern side of Selat Sinki is bounded by the following islands and reefs:—

General charts 2757, 3543.

Plan of Selat Sinki on 2403. Var. $0\frac{1}{2}^{\circ}$ E.

Pulo Saluk, a small islet, on a reef about half a mile in extent, forms the south-west side of the entrance, and is steep-to. Pulo Sudong, 55 feet high, lies $1\frac{1}{2}$ miles south-east of it, with much reef between them, out of the track. 5

Pulo Bosing, nearly $2\frac{1}{2}$ miles north-eastward of Pulo Saluk, is a small islet surrounded by reef; at 7 cables southward of it is Pulo Hantu, 62 feet high, westward of which four reefs dry in places at low water, extend a distance of $1\frac{3}{4}$ miles; the western one, which borders the strait, is half a mile in length, and dries 2 feet. 10

Beacons.—The north-west extreme of the western reef is marked by a red beacon, No. 1, surmounted by a staff with two cages. No. 3 red beacon has a staff and cage, and marks a small reef about $1\frac{1}{2}$ cables off the north-west extreme of Pulo Bosing reef. No. 5 is a similar beacon, marking the centre of the northern edge of Pulo Bosing reef. 15

A sunken rock is charted 4 cables southward of the reef, marked by No. 1 beacon, with Pulo Saluk bearing 250° true, distant $1\frac{1}{8}$ miles, in the deep water between the two groups of islands that trend east and west. 20

Freshwater island, or Pulo Bukum, forms the south side of the eastern entrance to Selat Sinki, its north extreme, which borders the channel, being situated one mile eastward of Pulo Bosing. It is $1\frac{2}{10}$ miles long, 131 feet high near its south end, and fringed by reef. 25

On the south-eastern peak of Freshwater island is a conspicuous house with a cupola and a red roof.

Beacons.—The reef which extends $1\frac{1}{2}$ cables from the north extreme of the island, is marked by a red beacon, No. 7, with staff and cage. 30

No. 9 beacon marks a small reef situated 3 cables eastward of Freshwater island pier; a patch of $3\frac{3}{4}$ fathoms lies $1\frac{1}{2}$ cables south-south-east of the beacon.

Beacons 11 and 13, red, each with staff and cage, mark the extremes of a small reef off the wharf near the south-east extreme of the island. 35
A beacon marks the south-east extreme of reef at 2 cables south-east of the south-east extreme of the island, and sunken rocks extend a farther distance of 2 cables. A patch which dries, a quarter of a mile in length, lies about 2 cables southward of the beacon, with a channel 4 cables wide, with deep water, between it and Pulo Jong, page 254. 40

Patches of 4 to $4\frac{3}{4}$ fathoms are situated on the bank $1\frac{3}{4}$ miles in length within a depth of 10 fathoms, eastward of Freshwater island. The least charted depth, 4 fathoms, lies 80° true, distant $1\frac{1}{10}$ miles,

General charts 2757, 3543.

Plan of Selat Sinki on 2403. Var. $0\frac{1}{2}^{\circ}$ E.

from the south-east extreme of Freshwater island. There are irregular depths eastward and south-eastward of the bank.

Pulo Ular and Pulo Bukum Kechil are situated between Freshwater island and Pulo Bosing to the westward, and are of no importance to navigation.

Communication.—Freshwater island is in telephonic communication with Singapore Exchange.

Water.—A small watering pier, for launches and small craft to go alongside, is situated on the north-east side of the island.

Jetty.—On the east side of the south point of Freshwater island there is a jetty 700 feet in length, with a depth of 33 feet alongside its southern end for about 400 feet, shoaling gradually to 28 feet at its northern end, and a vessel alongside would have a depth of 8 fathoms on the off side; the jetty is easy of approach.

Pilots.—See page 240.

Directions.—Selat Sinki is available for all classes of vessels, as before stated. From abreast and westward of Sultan shoal course may be shaped on either side of Ajax shoal buoy, but the channel southward of it is preferable; thence in mid-channel between the beacons marking the reefs on either side of the strait, to the entrance to Keppel harbour, for which see Directions on page 270.

At night.—Raffles island light bearing eastward of 125° true leads westward of Sultan shoal light and of Ajax shoal buoy; from thence in charge of a pilot if not acquainted with the navigation.

Chart 2403, Singapore strait.

ISLANDS south of Selat Sinki.—A group of islands and reefs, some 5 miles in extent, north and south, by about 6 miles east and west, lie southward of Selat Sinki; those bordering the strait have been described with it. They are separated by channels of deep water, but so encumbered with reefs as to render them unavailable for anything but small craft.

Pulo Sudong (*Lat. $1^{\circ} 12' N.$, Long. $103^{\circ} 44' E.$*), 55 feet high, lies nearly $1\frac{1}{4}$ miles eastward of Pulo Saluk, the north-westernmost of the group on the eastern part of a drying coral reef, $1\frac{1}{4}$ miles in length, on which is a rock above water, and a tree on its north-west part.

Alligator island, or Pulo Rengkam, is about three-quarters of a mile in extent, and situated three-quarters of a mile southward of Pulo Sudong.

The summit is conspicuous, being bare, except for a clump of trees, the tops of which are 176 feet above high water, on the western side.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

The island is fringed with reefs, and there are several detached reefs in the channels around it.

Shoal.—South-westward of Alligator island, and north of the fairway of Singapore Main strait, is a bank $4\frac{1}{2}$ miles in length, within the 10-fathoms contour line, with general depths of 6 to 8 fathoms. A shallow head with $4\frac{3}{4}$ fathoms water and from 5 to $5\frac{1}{2}$ fathoms for about 4 cables east and west of it, lies with the south extreme of Alligator island bearing 78° true, distant $1\frac{1}{4}$ miles. 5

Barn island, or Pulo Senáng, half a mile south-east of Alligator island, is about one mile in extent, 154 feet high at its south extreme, and covered with trees. It is fringed with a reef to the distance of 2 to $2\frac{1}{2}$ cables, extending a quarter of a mile from its east side, but barely 2 cables from its south-west side, near which are depths of from 9 to 10 fathoms. 15

Rabbit islet, with a fringing reef round it, about one cable in extent, and 69 feet high, is situated a quarter of a mile south-east of Barn island; reef extends north-east of it.

A detached reef lies about $2\frac{1}{2}$ cables south-west of Rabbit islet, and the same distance north-west of Raffles lighthouse; it has a depth of 12 fathoms close southward of it. 20

Coney islet, on which is built Raffles lighthouse, is the southernmost island of the group, and borders Main strait, at 3 cables southward of Rabbit islet; there is a small pier for the use of the lighthouse staff on its eastern side. Reef, steep-to, extends one cable southward of the lighthouse. 25

RAFFLES LIGHT (*Lat. $1^{\circ} 10'$ N., Long. $103^{\circ} 45'$ E.*).—A light is shown, at an elevation of 105 feet above high water, on Coney islet, from a white lighthouse, 91 feet in height, named Raffles light. For details, see Light list and charts. 30

The light, bearing westward of 248° true, leads southward of all dangers off the northern shore eastward of it; and bearing 101° true leads in the best water westward of the light, between the patches of $4\frac{3}{4}$ and $5\frac{3}{4}$ fathoms on either side.

Mangrove island, or Pulo Simakau.—Mangrove island, 85 feet high to the tops of its trees, and about one mile in extent, lies near the centre of the group. It is surrounded by drying reefs, and is separated from the adjoining islands by narrow channels of deep water, encumbered with shoals. 35

A reef about 2 cables in extent, and drying at low water, lies with its south extreme about 8 cables distance southward of the island; on its north extreme is a sand-cay 4 feet high, with another 2 feet high southward of it. 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{1}{2}^{\circ}$ E.

An isolated patch, which dries one foot, lies 4 cables southward of the sand-cay. From this patch a shoal with depth of 3 feet to 3 fathoms extends westward nearly to Alligator island; all these reefs lie northward of a line joining Raffles lighthouse and Middle island.

Pulo Siking, 97 feet high to the tops of the trees, lies between Mangrove island and Middle island, and is surrounded by reefs, for which see the chart.

Middle island, or Pulo Sebarok, the eastern island of the group, is half a mile in length, 55 feet high, and surrounded by a reef which projects 4 cables from the south-east point; a rock which dries 2 feet lies 4 cables beyond.

Bank.—A bank of 7 fathoms (1913) has been found at $13\frac{3}{10}$ cables, 127° true, from the south extreme of Middle island; it has not been examined, and less water may exist.

Clearing mark.—Pulo Jong open eastward of Middle island leads eastward of the rock south-east of Middle island, and Gunong Jantan, the summit of Great Karimun, in line with, or seen over, the north part of Barn island, bearing 258° true, leads southward of it.

Pulo Jong, 74 feet high to the tops of the trees, lies half a mile north-west of Middle island, with reef extending $2\frac{1}{4}$ cables south-east of it.

A reef dry at low water lies $5\frac{1}{2}$ cables, 300° true, from Pulo Jong, and at about $2\frac{1}{2}$ cables southward of Freshwater island beacon; a rock with 5 feet water lies about $1\frac{1}{2}$ cables north-east of the reef; both are steep-to.

Chart 1995, Singapore roads. Var. $0\frac{3}{4}^{\circ}$ E.

The Sisters are small islets situated $2\frac{1}{4}$ miles eastward of Middle island, and about 6 cables westward of St. John's island; Pulo Suber Besar, the southern islet, is 67 feet, and Suber Kechil, the northern, 79 feet high. They are surrounded by reefs to the distance of one cable, and close to their edges are irregular depths of 5 to 9 fathoms. The channel between them and St. John's island is deep and free from danger.

Chart 2403, Singapore strait.

A bank with depths under 10 fathoms extends $1\frac{3}{4}$ miles westward of the Sisters; on its southern edge is a shoal nearly a mile in length with depths of 3 to 5 fathoms.

Trumbu Seligi, a coral reef which dries 2 feet, and about a cable in extent, lies 7 cables, 325° true, from the North Sister islet; shallow water extends about $1\frac{1}{2}$ cables north-west of it.

General charts 2403, 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Beacon.—A red stone beacon, with cage, numbered 15, is erected on the eastern edge of Trumbu Selegi.

Palawan rock.—Beacon.—Palawan rock, about $1\frac{1}{4}$ cables in length, dry at low water, and fairly steep-to, lies $1\frac{1}{2}$ miles north-westward of Trumbu Seligi, and at about a cable distant from the reef fringing Blakang Mati. It is marked by a white conical beacon, No. 6, surmounted by two balls. 5

Plan 1995, Singapore road.

Islands in west approach to Singapore road.—St. John islands.—The eastern of these coral islands, known as East St. John island or Pulo Sakijang Pelepah, is 175 feet high, covered with scrub and uninhabited; the western or West St. John island, known also as Pulo Bandera Sakijang, is 100 feet high. 10

These islands are each about three-quarters of a mile long in a north-west and south-east direction, and surrounded by reef. 15

The fairway between the reefs fringing these islands is about one cable broad, with depths of 9 to 10 fathoms.

Quarantine station.—The quarantine station for Singapore is established on West St. John island, and there are several hospitals and fumigating sheds in telephonic communication with Singapore. 20

Landing is easily effected at a pier on the east side of the island. East St. John island is the burial place for those dying from infectious diseases. The quarantine anchorage is northward of the island, page 278. 25

Peak island, or Pulo Tembakul, eastward of East St. John island, wooded, and 108 feet high to the tops of the trees, is surrounded by a reef which extends a quarter of a mile from the north-west extreme and $1\frac{1}{4}$ cables from the south extreme.

There are a few native huts on the island, and a joss-house on the rock close westward of it. 30

The channel between East St. John island and Peak island is about one cable broad, with depths of 8 to 13 fathoms.

Pulo Renget Besar, a small islet with the tops of the trees 38 feet above high water, is situated on the south side of a reef 8 cables in length by 2 cables in breadth, dry at low water, and in places drying from 3 to 8 feet. Pulo Renget Kechil, 20 feet high to the tops of trees, lies at about a cable within the western extreme of the reef. 35

Beacons.—A white pile beacon marks the north-east extreme of the reef; a similar beacon marks the south side of the reef at $2\frac{1}{2}$ cables eastward of Pulo Renget Besar, and a red beacon with ball, the west extreme of the reef. A similar red beacon marks the edge of 40

General charts 2403, 2757, 3543.

Plan 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

the reef extending from the north-west extreme of East St. John island; a white beacon with ball marks the south-east side of the reef which dries 5 feet, situated north-west of Pulo Renget village. These
5 beacons are for the use of steam launches proceeding to or from St. John island.

Shoal.—Northward of the white beacon on the eastern extreme of Pulo Renget Besar reef, is a shoal 3 cables in extent in a north-west and opposite direction, within the 5-fathoms contour line, with
10 depths of $2\frac{1}{2}$ to $4\frac{3}{4}$ fathoms. A patch of $2\frac{1}{2}$ fathoms on its southern extreme lies 343° true, distant $2\frac{3}{4}$ cables from the beacon referred to. This shoal forms the west side of the quarantine anchorage for Singapore.

Harbour mark (*Lat. $1^{\circ} 13' N.$, Long. $103^{\circ} 52' E.$*).—A white
15 stone obelisk on the south-east side of Peak island marks the southern limit of Singapore road.

Pulo Sekukor, a narrow island $3\frac{1}{2}$ cables in length, north-west and south-east lies between West St. John island and the south extreme of Blakang Mati island. A patch of $2\frac{3}{4}$ fathoms lies between it
20 and that island, and there are numerous reefs north-eastward of it, for which the chart gives the clearest information. Only small local craft can navigate between them; the tidal swirls and eddies are very strong in the passage northward of Pulo Sekukor.

Clearing mark.—Fort Canning lighthouse in line with Telok
25 Ayer fish market clock tower, bearing 345° true, leads eastward of all the dangers between St. John islands and Malay spit, east side of approach to Singapore road.

Chart 2023, Keppel harbour.

PULO BLAKANG MATI lies to the southward of the
30 southern part of Singapore island, from which it is separated by Keppel harbour. The island is 2 miles in length in an east-south-east and west-north-west direction, and its western end terminates in Tanjong Rimau, the south point of the west entrance to Keppel harbour, but its eastern side is nearly one mile in length. A road extends the
35 whole length of the island.

Aspect.—**Mount Serapong** (*Lat. $1^{\circ} 15' N.$, Long. $103^{\circ} 50' E.$*), 292 feet high, is barren with the exception of the conspicuous tree on its summit, and is situated near the north-eastern extreme of Blakang Mati; it is conspicuous when approaching Singapore road from either
40 direction, and will assist a stranger in making out the land. There are several other hills of less height than Serapong upon Blakang Mati, but they are more observable in coming from the westward, when they will be seen under the higher land of Singapore island.

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Over Tanjong Rimau, the west extreme of Blakang Mati island, is Mount Siloso, 153 feet high, surmounted with a clump of fir trees, the tops of which are 226 feet above high water. Eastward of Siloso, and south from Berdaun island, is Mount Imbea, 204 feet high, and 5 other hills to the eastward, all of which are covered with small trees and scrub. Mount Imbea has on its summit a trigonometrical station, marked by a pole imbedded in a stone.

Reefs.—Off the south point of the island the reef fronting it extends about $1\frac{1}{2}$ cables, and dries 2 feet; thence about the same distance along its west side; Palawan rock (page 255) lies 2 cables from the west side of the island, at three-quarters of a mile from Tanjong Rimau, its north-west point. 10

Berhala spit.—Beacons.—From the south-east point of the island the fringing reef extends various distances off-shore, terminating in Berhala spit, off Tanjong Berhala, a cliffy point 40 feet high, and forming the south side of the east entrance of the eastern Selat Sinki. 15

The extreme of the spit lies $2\frac{3}{4}$ cables eastward of the point, and its north-east extreme is marked by a red stone beacon surmounted by an iron cage. A sunken ridge with depths of $1\frac{3}{4}$ to 3 fathoms extends a cable distance northward of the beacon. 20

A red stone beacon, with ball, No. 16, marks the edge of the reef at one cable north-north-eastward of the point, as before mentioned.

Buran Durat, off the eastern side of Blakang Mati, is a coral reef, with occasional patches of sand, about a mile in length, and a quarter of a mile in breadth at its northern end, tapering to a point at the southern extreme; rocky heads dry in places 4 and 5 feet. A spit with depths of one to 3 fathoms extends a cable north-westward of its north extreme. A number of reefs, some dry at low water, lie between its southern end and the St. John islands, as charted, and need no further description. 30

Beacons.—A white stone beacon, with ball, and numbered 17, marks the north-east extreme of Buran Durat, and a white stone beacon with cage, numbered 19, marks its north-west extreme. A white stone beacon with cage, numbered 21, marks the eastern edge of the channel between Buran Durat and the fringing reef of Blakang Mati, westward of the rocks which dry 5 feet on the western edge of Buran Durat. A red beacon with cage, numbered 12, marks the edge of the reef on the western side of the channel, at about half a cable distant from the cliffy point, and southward of the last-mentioned beacon. 35 40

General charts 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

The channel between Blakang Mati and Buran Durat, marked by the beacons described, has a fairway depth of not less than $3\frac{1}{4}$ fathoms, and is used by small local craft going round Blakang Mati island.

Chart 2403, Singapore strait.

Temporary anchorages for sailing vessels.—Owing to the strong tidal streams, in the western part of Singapore strait, sailing vessels are frequently obliged to anchor, for which purpose the north side of the channel is to be preferred.

Between Sultan shoal and Raffles lighthouse on that side there is convenient anchorage in depths from 6 to 12 fathoms, while to the southward the water is deep, and the bottom rocky; the south side of this part of the strait is, therefore, unsuitable for anchorage, especially as violent squalls are of common occurrence. The most convenient anchorage between Raffles lighthouse and St. John islands is the banks between the Sisters and Middle islands, in depths of 3 to 8 fathoms, as charted.

Abreast of the south end of St. John islands, vessels ought not to anchor if it can be avoided, for the water is deep, and the tidal streams and eddies run with greater strength than in any other part of the strait.

There is fair anchorage between Buffalo rock and Helen Mar reef, as well as about one mile or so to the northward and westward of the latter danger; also from one mile to 2 miles eastward of Buffalo rock, in 12 to 15 fathoms, or between it and Barren island. Vessels may stand closer inshore and anchor near the edge of the 10-fathoms contour line, south-westward and north-eastward of Barren island, except northward of Ganymede where a reef of 2 fathoms lies just within its edge; it is inadvisable to go closer in, on account of the strong tidal streams, sometimes rendering it difficult to get underway again, especially in the light winds which prevail here.

Vessels at anchor, or coming to an anchor during the night, should be careful to ascertain their position as nearly as possible, and to have a good bearing of Raffles light; they should also keep a vigilant lookout that they do not drag their anchors and drift into danger.

Pilots.—See page 240.

DIRECTIONS.—In proceeding eastward through the western part of Singapore strait, from a mid-channel position between Little Karimun and Tanjong Bulus, where there are depths of about 20 fathoms; no directions are necessary for a steam vessel, beyond keeping in the fairway other than observing that Raffles lighthouse, bearing 101° true, leads midway between the $4\frac{1}{4}$ fathoms and $5\frac{3}{4}$ fathoms on either side of the fairway.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

A sailing vessel should steer between 90° and 112° true, as the prevailing tidal stream may require.

Raffles lighthouse may be approached between the bearings 93° and 123° true. 5

Having passed Tree island lighthouse steer to round Raffles lighthouse from half a mile to one mile distant; or if the wind and tidal stream be adverse, or from other circumstances it be desirable to do so, anchor to the westward of Barn island, out of the strength of the stream. Having rounded Raffles lighthouse, steer to pass St. John 10 islands about half a mile distant, keep Raffles lighthouse bearing westward of 245° true, to avoid the rocks south-eastward of Middle island.

After passing West St. John island, and bound to Singapore road, proceed as directed at page 271; but if bound through the eastern part 15 of the strait, shape course to pass northward of Horsburgh light, and proceed as directed at page 296.

In working through between St. John islands and Raffles lighthouse, it is usual to keep on the north side of the channel, making short tacks if necessary, as that part of the strait affords tolerably 20 convenient anchorage along the greater portion of it, and vessels are liable to meet with light baffling airs which would render it necessary to anchor. It is especially requisite to attend to this when eastward of Buffalo rock, for on that part of the south side of the strait the water is deep, and the bottom rocky and unsafe for anchoring, the 25 danger being much increased by rapid tidal streams with eddies and overfalls.

All danger on the north side of this part of the strait will be avoided if the south extreme of West St. John island be kept bearing northward of 65° true, or Raffles lighthouse, astern, westward of 30 245° true, but these bearings more particularly apply to the rock which dries 2 feet, south-eastward of Middle island. (A patch of 7 fathoms not yet examined has been found outside these bearings, and there may be less water.) While to the westward of the rock, vessels may stand to the northward until the south end of West St. 35 John island bears 67° true, and eastward of the rock between Middle island and the Sisters, as far as 79° true, observing that Pulo Jong open westward or eastward of Middle island, clears the rock.

Approaching Buffalo rock from the westward, a vessel may stand to the southward, if necessary, until Red islet bears 266° true, astern, 40 which leads northward of Helen Mar reef, but it is better to keep to the northern shore.

For proceeding westward, reverse the above directions.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Tides and tidal streams.—It is high water, full and change, at Raffles lighthouse, at XIh., but the stream does not set to the eastward till two hours later, and it is then about half ebb by the shore.

- 5 The tidal streams from Malacca strait and from the China sea meet between Tree island and Tanjong Bulus, but no dependence can be placed upon them; they sometimes run strong towards Durian strait, and at other times northward towards the Old strait of Singapore. For streams farther to the westward, *see* page 238, and to the eastward, page 295.

In Singapore Main strait the ordinary rate of the tidal streams at springs is 2 knots, but it is much influenced by the prevailing monsoon, and may run at the rate of as much as 4 knots.

- 15 The west-going stream is strongest during the N.E. monsoon, and during neaps may prevail for two or three days, though the rise and fall continues; it commences about two hours after the lowest low water, and continues until about one hour before the time of the next following highest high water, *i.e.*, about 16 hours.

- 20 The east-going stream is strongest during the S.W. monsoon, when the fluctuations of the streams are not so frequent; it commences about one hour before the time of the highest high water, and continues about two hours after the next following lowest low water, *i.e.*, about eight hours.

- 25 The true set of the tidal streams is found from about a mile southward of Raffles lighthouse to a mile southward of Peak island, and in Keppel harbour, southward of the P. and O. company's wharves.

The east-going stream is not strong in Singapore roads or northward of St. John and Peak islands, and at times a back eddy is found.

- 30 The west-going stream is more generally experienced.

Chart 2023, Keppel harbour.

KEPPEL HARBOUR.—General remarks.—Depths.

- Keppel harbour, between Singapore and Blakang Mati islands, is about $2\frac{3}{4}$ miles in length, in an east and west direction, but the main
35 channel takes a somewhat serpentine course; its breadth is about 2 cables, but in several places is not more than $1\frac{1}{2}$ cables. *See* Port regulations in Appendix I., pages 470-474.

- Situated as it is in the very centre of Eastern commerce, Keppel harbour is of considerable importance and possesses extensive dock and
40 wharf accommodation of the highest possible value. The Singapore Harbour Board have extensive coal stores, capacious docks, and wharves, the latter allowing of the largest steam vessels being lashed alongside in perfect security. There is a large wet dock fitted

General charts 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

with all modern appliances, and several dry docks. It is the place of arrival and departure of the mail steamers; and all other steam vessels proceed here to coal. The Peninsular and Oriental Company also have a wharf here.

5

The whole of the above establishments are situated on the north or Singapore side of Keppel harbour.

Both sides of the harbour are fringed with reefs which dry at low water, but close to their edges there are usually depths of 3 to 4 fathoms, increasing suddenly to 5 and 6 fathoms.

10

Depths.—The harbour, and both entrances to it, have sufficient water for all classes of vessels, and there are depths of from 18 to 40 feet or more alongside the wharves at low water. *See Wharves, page 264.*

As an anchorage, Keppel harbour is indifferent, but the harbour authorities do not now permit vessels to anchor except under special circumstances. *See Port regulations, Appendix I., pages 470-474.*

15

The western entrance (*Lat. $1^{\circ} 15' N.$, Long. $103^{\circ} 48' E.$*) is a little more than one cable wide, and lies between Tanjong Rimau and Tanjong Blayer. The eastern entrance lies between Tanjong Pagar and Teregeh spit where it is $4\frac{1}{2}$ cables wide.

20

WESTERN ENTRANCE to Keppel harbour.—**Tanjong Blayer** (*Lat. $1^{\circ} 16' N.$, Long. $103^{\circ} 48' E.$*), the north-west entrance point to Keppel harbour, is formed of cliffs about 47 feet high. From thence the clifly coastline outside the harbour trends in a north-westerly direction, backed by a ridge of densely-wooded hills, and is fringed with a white beach named Pasir Panjang, or Long beach, fronted by a reef, half a cable in width. The coast beyond has been described with Selat Sembulan.

25

Eastward, between Tanjong Blayer and Bukit Chermin there is an impassable mangrove swamp into which Sungai Blayer empties itself, off the mouth of which a reef extends a distance of about one cable.

30

Obelisk.—About 50 yards north-west of Tanjong Blayer, is a white obelisk denoting the harbour limit in this direction.

35

Pier.—At 130 yards north-eastward of Tanjong Blayer is a military pier, with a low-water depth of 13 feet at its extreme.

Lot's Wife is a rock about 6 feet high, lying immediately off Tanjong Blayer at the edge of the drying reef. Shallow water extends about 50 yards outside the beacon, and is steep-to.

40

Beacon.—A white beacon, surmounted by a staff and ball, numbered 8, is situated on the south edge of the shore reef.

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Blayer rock, with a least depth of 7 feet, lies 242° true, distant half a cable from Tanjong Blayer, and is fairly steep-to on its south side.

- 5 **A patch** of 3 fathoms lies 275° true, distant $2\frac{3}{4}$ cables from Tanjong Blayer, and is the shoalest part of a ridge having depths of from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, with 7 and 8 fathoms close to its outer edge; there is a depth of about 6 fathoms between this ridge and the reef fronting Pasir Panjang beach.

- 10 **Leading mark.**—The Pilots' Club flagstaff in line with Tanjong Tereh, a conspicuous red bluff on the north end of Pulo Brani, bearing 84° true, leads southward of the ridge, Blayer rock, and of Keppel rock, farther up the harbour; it is also the fairway mark, through the entrance and up the harbour to nearly abreast Keppel rock.

- 15 **Chermin bay** is a bight in the coast between Bukit Chermin, 160 feet high, wooded, and with a building on its summit; it forms the entrance to the King's dock.

- The Eastern Extension Telegraph Company's** wharves and camber are situated at the head of Chermin bay. Eastward of them are the Keppel harbour section of the Singapore Harbour Board's wharves.

Nos. 1 and 2 dry docks, and the King's dock, with the various buildings in connection with the docks and wharves, are what are known as the Keppel harbour section.

- 25 There are landing steps both sides of the entrance to the King's dock, and a camber west of it.

- The Keppel harbour wharves are not so easy to go alongside as the other wharves. Eastward of the sheers the depth alongside is from 23 to 24 feet, and westward of the sheers from 16 to 18 feet at low water springs.

A patch of $4\frac{1}{2}$ fathoms, with 7 fathoms around, lies 209° true, distant about 120 yards from the eastern landing steps at the King's dock.

- Hantu**, the small round island lying in front of Chermin bay, is nearly $1\frac{1}{2}$ cables in diameter, 133 feet high, and covered with trees. A reef fringes the east, south, and west sides of the island; the north-east side, opposite the dry docks, is nearly free from reef, with depths of 3 fathoms at 50 yards from the island.

- The channel between the island and the docks is half a cable wide, with depths of $4\frac{1}{4}$ to 6 fathoms.

Beacon.—The edge of the reef, on the south side of Hantu, is marked by a white beacon surmounted by a staff and ball, numbered 10.

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Telok Blanga, choked with reef, and dry at two-thirds ebb, lies between the King's dock and the Peninsular and Oriental Company's wharves.

Keppel rock, with a depth of 4 fathoms, lies just within the 5-fathoms contour line fronting the northern shore, bearing 239° true, distant 110 yards, from the nearest corner of the Peninsular and Oriental Company's wharves; the depths are about 6 fathoms in the fairway, close southward of it, and about $4\frac{3}{4}$ fathoms inshore.

Mæander shoal lies between one and 2 cables south-eastward of Keppel shoal, with depths of $5\frac{1}{4}$ to 7 fathoms in the fairway of the harbour between. Within the 5-fathoms contour line it is $1\frac{1}{2}$ cables in length by three-quarters of a cable in breadth, and its northern shoal spot of $1\frac{1}{2}$ fathoms lies 158° true, distant $1\frac{1}{4}$ cables from the west extreme of the Peninsular and Oriental wharves.

Buoys.—The north-west and eastern extremes of the shoal are each marked by a red buoy surmounted by a ball. The channel southward of the shoal has a least depth of $4\frac{1}{2}$ fathoms.

Peninsular and Oriental Company's wharves are situated eastward of the King's dock, where the vessels of that company lie alongside. These wharves are in course of reconstruction.

There are extensive coal stores and warehouses within, connected with the town of Singapore by a good road and tramway. A bank of 19 feet extends about 60 yards southward of the dolphin between the eastern wharves.

Telok Sibet, dry at low water out to the ends of the wharves, is simply an indentation of the coastline between the P. & O. Company's wharves and the cliffy peninsula at about a cable eastward of them. On St. James' hill summit, 50 feet high, is a large house partly hidden by trees, a fine feature in the delightful scenery of the harbour. Eastward of St. James' hill is Telok Blangah, similar to that of Telok Sibet to the westward, also drying out to its extreme points.

A patch with a least depth of $2\frac{1}{4}$ fathoms lies about 50 yards off the drying reef at Telok Sibet, bearing 205° true, distant half a cable from the western extreme of St. James' peninsula.

Clearing mark.—The Pilots' Club flagstaff just shut in with, or over Tanjong Tereh, bearing 83° true, or northward of that bearing, when nearing Keppel rock, clears it and the $2\frac{1}{4}$ -fathoms patch.

The submarine telegraph cable crosses the harbour from the east side of St. James' hill to Pulo Brani; there is a notice board on either shore marking it, and warning vessels not to anchor over it.

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

The Singapore Harbour Board's wharves.—From Telok Blangah to Tanjong Pagar, a distance of $1\frac{1}{4}$ miles, the shore is occupied by the Colonial Government or Tanjong Pagar wharves, docks, and coal stores, the docks and factories being situated near the eastern end, and the new wet dock or basin eastward of the coal stores. At the west end of the coal stores is Jardine's wharf, Section 9.

Brani ferry starts from the steps within the west end of this wharf.

A considerable length of these wharves have ample depths for vessels of the deepest draught to go alongside at all times, as will be seen on the chart.

This stretch of wharves is divided into sections, Nos. 1 to 9, or more, numbered from the eastward, No. 1 being that between East wharf and the pier extending southward from the sunken hulks.

No 6, that portion of the Colonial Government wharf on the east side of the entrance to the wet dock, has a depth of $33\frac{1}{2}$ feet alongside at low water springs.

The godowns or warehouses are numbered 1 to 49. Vessels not going to private wharves are signalled from the Pilots' Club flagstaff as to the wharf to which they are to proceed. See Signals, page 241.

A Wet dock of $24\frac{1}{2}$ acres in extent, 2,450 feet in length, 425 feet in width for the greater portion of its length, and 600 feet in its western portion, has an entrance (Section 7) 150 feet wide, from between the West wharf and the Main wharf. A number of godowns have been built around the dock, and the railway runs close alongside them. Works are in course of construction to complete the many wharves, and the details of the docks by 1916.

The dock will accommodate six large vessels, with a draught of 30 feet, afloat.

Main wharf is 3,150 feet in length, and is now being reconstructed.

East wharf, at the eastern extreme of the Main wharf, and north side of the entrance to the harbour from the eastward, has a frontage of 1,200 feet in length from the entrance to the Albert dock.

Pier.—Light.—A number of hulks are sunk to the eastward of the East wharf, with a temporary light at the southern end.

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

TANJONG RIMAU, the north-west extreme of Blakang Mati island, and the south-west limit of Keppel harbour, is formed of cliffs with patches of shelving rock projecting from their bases. The shore reef extends one-third of a cable in a westerly direction from the point, with depths of from 9 to 16 feet close-to, and from .7 to 8 fathoms beyond. 5

Military pier.—Nearly 2 cables eastward of Tanjong Rimau is a military pier with a depth of about 10 feet at low water at its extreme; a road leads thence to the east end of the island. 10

A small patch of $1\frac{1}{4}$ fathoms, sand and shells, lies 315° true, distant half a cable from the centre of the head of the pier.

Berdaun islet is the central portion of a coral reef, covered with mangroves, the tops of which are 18 feet above high water; it is distant about half a mile eastward from Tanjong Rimau, and half a cable from the southern shore. The reef, dry at low water, extends about two-thirds of a cable westward, and about a third of a cable northward and eastward from the islet, with shallow water extending half a cable beyond the eastern part. 15

Selegi island lies on the western side of the entrance of Selat Sinki, about 2 cables eastward of Berdaun islet, and fronts a bight, dry at low water, named Imbea bay. It is a remarkable little island, 86 feet high, wooded, almost circular in shape, and has a short stone pier on its north-east side. 20

Mæander shoal, eastward of it, has been described with Keppel rock, page 263. 25

PULO BRANI, on the south side of Keppel harbour, forms the north side of Selat Sinki; it is nearly two-thirds of a mile in length, in an east and west direction, with an extreme breadth of 4 cables. On its north-eastern side are three hills, the middle one, which is the highest, being 157 feet high, and covered with trees. The southern side of the island forms the northern shore of Selat Sinki. 30

Tin works.—On the south side of Pulo Brani are tin smelting works, with a wharf 150 feet in length, having from 18 to 20 feet water alongside. The Bon Accord dock (in ruins) is situated on these works. 35

Tanjong Risim and spit.—Pulo Brani, like Blakang Mati, is encircled by a coral reef with occasional patches of sand, which uncover at about two-thirds ebb, and from Tanjong Risim, the west end of the island, extends a distance of $1\frac{1}{2}$ cables, and forms a spit. 40

General charts 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0^{\circ}34'$ E.

Beacon.—The outer edge of the spit extending from Tanjong Risim is marked by a white stone beacon, surmounted by a ball, and numbered “24.”

5 **Coast.**—The north-west coast of Pulo Brani, between Tanjong Risim and Tanjong Tereh, is fronted by the extension of Tanjong Risim eastward for a distance of $1\frac{3}{4}$ cables, where it terminates abreast Kampong Brani, which has been built over the reclaimed portion of Saga bay.

10 **Pier.**—There is a pier extending to a little beyond low water from Tanjong Risim, with a boat shed and slip close eastward of it. At the north-east edge of the cliff eastward of the pier is a notice-board, marking the cable from the northern shore, between which anchorage is prohibited.

15 **Coal stores.**—Westward of Tanjong Tereh are some coal stores, with a short pier, and a depth of 18 feet at its extreme; owing to the strength of the ebb or east-going stream here it is only used by small craft.

20 **Brani reef,** commencing at Tanjong Tereh, extends in a crescent form eastward of the island, attaining a distance of $2\frac{1}{2}$ cables eastward of Tanjong Teregeh. It is formed of flat rough coral with occasional patches of sand, and uncovers at half ebb.

For Buoys, *see* page 268.

25 **Teregeh spit.—Beacons.**—A white stone beacon, with ball, numbered “18,” marks the extreme eastern edge of Teregeh spit, which forms the north side of the eastern entrance of Selat Sinki.

A similar beacon marks the edge of the reef, three-quarters of a cable south-eastward of Tanjong Teregeh, numbered “20.”

30 **Tanjong Tereh,** the north extreme of the island, is a cliffy point rising within to a height of 94 feet, with many buildings on its grassy slopes. It presents a bold red bluff, which is conspicuous when viewed from either entrance to the harbour. From Tanjong Tereh the cliff continues all along the east coast of the island, broken in places by sandy coves, to which the tide only reaches towards high
35 water.

SELAT SINKI, the channel between Pulo Brani and Blakang Mati, with a least depth at low water of $3\frac{1}{4}$ fathoms in the fairway, is navigable for vessels of light draught, but owing to the uncertainty of the direction of the gusts of wind caused by the adjacent high land,
40 it can scarcely be considered as safe for sailing vessels. (The western approach to Keppel harbour is also known as Selat Sinki.)

General charts 1995, 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Shoals.—The strait is obstructed by a shoal of from $1\frac{3}{4}$ fathoms to 3 fathoms which extends $1\frac{1}{2}$ cables east-south-eastward from the beacon westward of the tin works, and which narrows the navigable channel to a breadth of 50 yards; and by a bank of $2\frac{3}{4}$ fathoms, which extends half a cable northward from the Military pier, and narrows the channel to a width of 70 yards. There is a patch of $1\frac{3}{4}$ fathoms on the first-mentioned bank, situated 106° true, distant 120 yards from the white beacon, and a patch of 2 fathoms, 276° true, distant 160 yards from the same beacon.

Beacons (*Lat. $1^{\circ} 15' N.$, Long. $103^{\circ} 50' E.$*).—On the north side of Selat Sinki, in addition to the white stone beacons on Risim spit at the west end, and on Teregeh spit at the east end, previously mentioned, there is a similar white stone beacon, surmounted by a ball, and numbered “22,” marking the southern edge of the detached reef westward of the tin works.

On the south side of the eastern entrance a red stone beacon, surmounted by an iron cage, and numbered “14,” marks the north-east extreme of Berhala spit, and a red stone beacon, surmounted by a ball, and numbered “16,” marks the northern edge of the reef, at three-quarters of a cable off Tanjong Berhala.

Mooring buoys.—There are red mooring buoys for Government steam launches on the north side of the channel.

Tidal streams.—The tidal streams in Selat Sinki run with considerable strength, the flood to the westward and the ebb to the eastward, with no slack water; there are swirls and eddies at the eastern entrance and on the spit extending from the Military pier.

EASTERN ENTRANCE to Keppel harbour.—**Depths.**—The eastern entrance is divided into three channels by the Tembaga rocks and Brani shoals. The north channel affords the best water, the least depth being about $6\frac{1}{4}$ fathoms, between Tembaga rocks and the wharves. Middle channel has not less than $3\frac{3}{4}$ fathoms on the straight course, and South channel about $3\frac{1}{4}$ fathoms. Directions, see page 271.

Brani shoals separate Middle channel from South channel, between Tanjong Pagar and Pulo Brani, and within a depth of 3 fathoms, extend about 5 cables in the direction of the channel. The least water upon these shoals is $1\frac{3}{4}$ fathoms, bearing from the Pilots' Club flagstaff 238° true, distant 3 cables.

The extension of the bank north-westward has depths of $3\frac{1}{2}$ to 4 fathoms, and is connected with Tanjong Tereh by a narrow ridge with depths of $3\frac{3}{4}$ to 5 fathoms.

General charts 1995, 2403, 2757, 3543.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Buoys.—Too much dependence must not be placed on the buoys maintaining their charted positions, but the harbour authorities remove them from time to time.

- 5 Brani shoals are marked by four white conical buoys, surmounted by balls, and are moored in from $2\frac{1}{2}$ to 3 fathoms water, one being placed at each end, and one on either side; the shoalest water lies midway between the two latter. A patch, with a depth of 3 fathoms, lies half a cable eastward from the south-east buoy.
- 10 Brani reef, extending from Pulo Brani, on west side of South channel, is marked by two black buoys, surmounted by balls, and forming the western boundary of South channel; the southern lies $1\frac{1}{4}$ cables north-eastward of Teregeh spit beacon, and the northern at about half a cable off the reef abreast Brani bay.
- 15 The depths decrease gradually towards Brani shoals, except along the south-western edge; but elsewhere the lead, if properly attended to, will show when a vessel is nearing them.

- 20 **Tembága rocks** (*Lat. $1^{\circ} 16' N.$, Long. $103^{\circ} 50' E.$*), drying in patches at low water, spring tides, lie between the Colonial Government wharves and Brani shoals, and are about 120 yards in length in a north-west and south-east direction, and from 20 to 30 yards in breadth. Depths of $3\frac{1}{4}$ to 5 fathoms extend nearly a cable westward of the northern beacon, and to about half that distance south-east of the southern beacon.

- 25 **Beacons.**—The north-west and south-east extremes of Tembága rocks are each marked by a red stone beacon, surmounted by a ball.

Tembága shoal, about half a cable in extent, and with a depth of $2\frac{1}{2}$ fathoms, lies three-quarters of a cable north-westward of Tembága rocks.

- 30 **Buoy.**—On the north-eastern end of Tembága shoal is a red buoy, surmounted by a ball, in about $2\frac{1}{2}$ fathoms.

Tides.—It is high water, full and change, at the Harbour Board's wharves, at Xh. 35m.; springs rise from $8\frac{1}{4}$ to $10\frac{1}{4}$ feet, neaps from $6\frac{1}{4}$ to 8 feet. *See Admiralty tide tables.*

- 35 At the Harbour Board's wharf there is a self-registering tide gauge.

The diurnal inequality affects the height of low water frequently as much as $4\frac{1}{2}$ feet, whilst the height of high water is only affected by one foot. The greatest range occurs on or about the second or third day after full and change.

General charts 1995, 2403.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

The general sequence is one high and one low water, followed by a second high and low water of considerably less range, amounting at times to only a few inches.

Tidal streams.—In Keppel harbour the streams run strongest between the western entrance points and off the north end of Pulo Brani at about the rate of 3 knots, but in the western entrance it amounts at times to 4 knots. 5

Eddies.—The ebb or east-going stream at springs, running through Keppel harbour, causes somewhat dangerous swirls and eddies; the flood or west-going stream is more uniform, eddies only occurring between the points of the west entrance. 10

In Chermin bay the streams sweep round Hantu island with considerable force, but close to the Telegraph Company's wharves at the head of that bay is an eddy stream on both tides. There is also a slight eddy at each end of the P. & O. Co.'s wharves. 15

Alongside the wharf at Pulo Brani, it is quite slack water on the flood, but the ebb runs strongly.

The flood stream sweeps to the westward along the Harbour Board's wharves from the dry docks as far as West wharf with very little strength, but thence it runs strongly. On the flood, on the western side of Tanjong Pagar, the projecting line of wharves causes slack water on that side. Approaching Tanjong Pagar, if unaware of this fact, the bow being in slack water with a strong current on the quarter, an awkward sheer might be experienced, and should be guarded against. 20 25

Charts 2403, 1995.

Examination anchorages.—There are two examination anchorages at Singapore, the western and the eastern.

Western anchorage, in the western approach to Keppel harbour.—The limits are as follows:— 30

- (a) On the north by a line drawn from a position situated 12 cables, 66° true, from the north-west extreme of Freshwater island, in a 66° true direction for a distance of 10 cables.
- (b) On the east by a line drawn in a 156° true direction for a distance of 8 cables from the eastern extremity of limit (a). 35
- (c) On the west by a line drawn in a 156° true direction for a distance of 8 cables from the western extremity of limit (a).
- (d) On the south by a line joining the southern extremities of limits (b) and (c). 40

Note.—The prolongation of this limit to the north-eastward passes through Palawan reef beacon.

General charts 1995, 2403.

Charts 2403, 1995. Var. $0\frac{3}{4}^{\circ}$ E.

Eastern anchorage, west side of approach to Singapore road :—

- 5 (a) On the north-east by a line drawn from a position situated $5\frac{2}{10}$ cables, 115° true, from the white ball beacon on the north-east end of Buran Durat, in a 115° true direction for a distance of $17\frac{1}{2}$ cables.

Note.—On this limit, the above-mentioned beacon and the 157-foot summit on Pulo Brani are in transit.

- 10 (b) On the south-east by a line joining the eastern extremity of limit (a) with the summit of Peak island.
(c) On the west by a line joining the western extremity of limit (a) with the summit of Peak island.

15 *Note.*—This limit coincides with the western limit of the red sector of Fort Canning light.

Anchorage.—The harbour authorities, however, do not permit vessels to anchor in Keppel harbour, except under special circumstances, as it obstructs the traffic. The general depths in Keppel harbour are from 6 to 8 fathoms, but the bottom is foul, rocky, and indifferent holding ground, and care is necessary to prevent fouling the anchors. See Port regulations, Appendix I., pages 470-474.

20 Vessels, waiting for a few hours preparatory to dropping alongside the wharf, are occasionally anchored off the Royal Engineers' pier at Tanjong Risim, on Pulo Brani, and this anchorage used to be considered the best in Keppel harbour. They are sometimes temporarily anchored off the wharf south-westward of Tanjong Tereh, as charted.

The tidal stream runs strongly (about 3 knots) at both anchorages, but close westward of the north-west buoy of Brani shoals, in depths of $3\frac{1}{2}$ to 4 fathoms, the streams are slacker.

30 **DIRECTIONS.**—Although there is no difficulty in piloting vessels into or through Keppel harbour, or alongside any of the wharves, strangers are recommended to employ pilots until sufficiently acquainted with the local peculiarities, which may possibly cause difficulties in such a place where the space is limited and the tidal streams are strong. See Examination anchorages, page 269; Coaling signals for going alongside the wharves, page 241; and Port regulations, in Appendix I., pages 470-474.

Chart 2023, Keppel harbour.

40 **Western entrance.**—For the directions for approaching Keppel harbour from the westward, by Selat Sinki, see page 252.

Vessels proceeding into Keppel harbour through the western entrance, which is little more than one cable wide, should keep in mid-channel, with the Pilots' Club flagstaff in line with Tanjong

General charts 1995, 2403.

Chart 2023, Keppel harbour. Var. $0\frac{3}{4}^{\circ}$ E.

Tereh, bearing 84° true, which will lead southward of the 3-fathoms patch outside the harbour, also of Blayer rock, and of the reef extending off Hantu, on which there is a white beacon.

Approaching Keppel rock, the Pilots' Club flagstaff should be just shut in with Tanjong Tereh, bearing 83° true, which leads between Keppel rock and Mæander shoal, and southward of the $2\frac{1}{4}$ -fathoms patch southward of Telok Sibet. 5

When eastward of Mæander shoal edge towards mid-channel until it is known to which wharf the vessel is directed. 10

Approaching the western entrance of Keppel harbour, from the south-eastward, the channel between the Sisters and Middle island is recommended. Between the 3-fathoms shoals half a mile westward of the Sisters and the sunken rock south-eastward of Middle island, the channel is $1\frac{1}{4}$ miles in breadth. Pulo Jong kept open eastward of Middle island, bearing 304° true, leads eastward of the rock. 15

Trumbu Selegi, marked by a beacon, three-quarters of a mile north-westward of the Sisters, should be given a wide berth; Palawan rock, marked by a beacon near the coast of Blakang Mati, should be given a berth of a cable; thence to the entrance to Keppel harbour there are no dangers beyond a quarter of a mile off-shore. 20

Vessels of deep draught should avoid the ridge with $4\frac{1}{2}$ fathoms extending westward of the 3-fathoms patch westward of the Sisters, and the ridge with same depths eastward of Freshwater island.

Eastward of the Sisters, and between them and West St. John island, is a good and deep channel, half a mile wide, for which the chart is sufficient guide. 25

Tidal streams.—The tidal streams are very irregular in the passages among these islands, running sometimes 4 knots an hour at springs. 30

Charts 1995, 2023.

Eastern entrance.—Approaching the eastern entrance from the south-eastward, from a position a quarter of a mile eastward of Peak island, Fort Canning lighthouse, in line with the clock tower on Telok Ayer fish market, bearing 345° true, leads in a depth of $5\frac{3}{4}$ fathoms; when Mount Faber bears 290° true, steer for it on that bearing. 35

Vessels proceeding from Singapore road into Keppel harbour should steer to the south-westward, hauling to the westward when Mount Faber signal station flagstaff is well open southward of East wharf, bearing 290° true, which being steered for leads to the entrance of North and Middle channels, and at about half a cable off East wharf. 40

General charts 2403, 2757, 3543.

Charts 1995, 2023. Var. $0^{\circ}34' E$.

Middle channel.—The above leading line being continued leads obliquely through Middle channel, crossing the western extreme of the ledge extending westward of the Tembága rocks, in $4\frac{3}{4}$ fathoms, and northern tail of Brani shoals in $3\frac{3}{4}$ fathoms water. Better water will be obtained near the latter by edging to the northward for the entrance to the Wet dock as soon as the north-western beacon on the Tembága rocks bears 60° true.

To proceed through North channel, which is the best for vessels of heavy draught, having steered for Mount Faber on the leading line above given; when abreast East wharf steer midway between the beacons marking Tembága rocks, and the wharves, and to the wharf appointed by signal.

South channel.—Tanjong Selensing, situated 3 cables south-east of the north extreme of Pulo Brani, being steered for when bearing 281° true, will lead up to and between the black buoy north-east of Teregeh spit and the white buoy at the south-east extreme of Brani shoals, in not less than 4 fathoms; thence steer in the fairway at about half a cable westward of the middle white buoy, and between the black and white buoys at the northern end of the channel, when course may be altered for the wharf appointed.

Proceeding alongside the wharves.—Vessels of war and all the large steamers which do not own private wharves make use of the extensive wharf accommodation provided by the Harbour Board. These wharves are easy to go alongside, but vessels usually employ a pilot, as the tidal streams are strong at times, and the space for manœuvring so limited, that an intimate knowledge of the harbour is necessary. With a favourable strong stream it has been sometimes necessary to go right through the harbour, and turn outside; for signals relating to going alongside the wharves, *see* page 241.

Docking accommodation.—There is dock accommodation for the largest vessels. *See* Appendix II., page 475, and Wet dock, page 264.

Coal and supplies.—About 130,000 tons of coal are kept in stock by the several firms. From 800,000 to 900,000 tons are imported annually. Vessels can be coaled at the rate of 100 tons per hour, and six vessels can be coaled at the same time, not including the wharfage accommodation in the Wet dock. Coaling is carried on by baskets. Heavy squalls in the south-west monsoon period occasionally impede coaling in Singapore roads. An unlimited supply of lighters are available.

The supply of liquid fuel is practically unlimited.

Supplies of all kinds are obtainable, and good water from the municipal reservoir is laid on to the wharves.

General charts 2403, 2757, 3543.

Charts 1995, 2023. Var. $0\frac{3}{4}^{\circ}$ E.

Tugs.—There are about 9 tugs, and several steam launches, available.

Repairs.—The steam sheers on the Harbour Board Tanjong Pagar wharf, which has a least depth of 33 feet alongside, will lift 60 tons, and that on the Board's Keppel harbour wharf, which has a depth of 24 feet alongside, will lift 30 tons. Repairs to hulls, engines, and boilers of the largest class can be effected by the Harbour Board. Repairs to native craft are effected at Tanjong Rú, page 276. 5

Communication.—There is frequent mail communication by steamers of the P. & O. and other large companies; and by local steamers to the several ports of the Straits Settlements. There is telegraphic communication with all parts; the telegraph office is always open. There is railway communication across the island to Woodlands station on Johor strait, a distance of about 14 miles. See also page 4. 10
15

Pilots' Club is situated close to the east side of the entrance to Albert dock, and is distinguished by a flagstaff with signal yard upon which the signal is hoisted to indicate the section to which a vessel is to proceed alongside. Pilots are always to be found here. 20

Observation spot.—For the convenience of shipmasters large flat stones have been placed for astronomical observations. One of these is near the Pilots' club, at the entrance to Albert dock, and is in lat. $1^{\circ} 15' 55''$ N., long. $103^{\circ} 50' 41''$ E.

Mount Faber is the name of a conspicuous range of hills which rises boldly near the middle of the northern shore of Keppel harbour. The direction of the range is about north-west and south-east, the highest point, 347 feet, being towards its north-west end. Guthrie hill, 100 feet high, is isolated and conspicuous, and situated about a quarter of a mile northward of the Victoria dry dock. 25
30

Signal stations.—Near the middle of the range is a flagstaff, which, like that upon Fort Canning hill (page 277), is crossed by two yards, used for signalling the arrival of vessels from the westward, and repeating the signals made from Fort Canning. The height of the range where the flagstaff stands is 295 feet, nearly the same height as Mount Serapong on the opposite side of Keppel harbour. 35

These stations are the property of, and are controlled by, the Colonial Government of the Straits Settlements. At these stations day watch only is kept, but if it is desired to keep watch for a vessel with a view to delivering orders during the night the aid of the Singapore Pilots' Association's launch can be obtained. The charge for this 40

General charts 2403, 2757, 3543.

Charts 1995, 2023. Var. $0\frac{3}{4}^{\circ}$ E.

launch at night time is \$5 per hour. It is desirable that owners should state always when a vessel is due to arrive for orders, and also whether the vessel will wait until daylight to obtain the orders, or
5 whether the Pilots' Association's launch is to be utilised.

The observatory is situated about $1\frac{1}{2}$ cables south-eastward of Mount Faber signal staff.

Time signals.—See page 277.

Chart 1995, Singapore road.

10 **SINGAPORE ROAD.—Depths.**—Singapore road lies eastward of Keppel harbour, its approach being between St. John islands and Tanjong Katong, about 5 miles apart. At the head of the bay is the town and river of Singapore, with Sungi Gelang within Tanjong Rû eastward of it. The depths are only from 2 to 4 fathoms for over
15 a mile seaward of the river, and from a half to three-quarters of a mile seaward of the breakwater.

In the eastern part south-westward of Tanjong Katong are several detached patches; on the outermost is a patch of 2 fathoms, situated with the white obelisk westward of the point bearing 16° true, distant $7\frac{1}{4}$ cables.
20

Seaward of the 5-fathoms contour line and within Outer shoal there are depths of 6 to 12 fathoms, mud and sand bottom, from $1\frac{1}{4}$ to 2 miles south-eastward of the town and river, available for all classes of vessels. The water shoals somewhat abruptly within the
25 5-fathoms contour line in most places, as will be seen on the chart, requiring caution in vessels of deep draught when picking up an anchorage.

Harbour limits.—The boundaries of the harbour of Singapore are defined as follows:—

30 A line from the obelisk on Tanjong Katong to that on Peak island, thence along the northern coast of that island to its north-western point, and from thence to the northern extreme of East St. John island. From this position the boundary runs west until intersected by a meridian through the western beacon on Cyrene reef, thence
35 northward of that meridian to Singapore island, and then eastward along the coast of that island to the obelisk on Tanjong Katong, including certain portions of Singapore, Kalang, and Gelang rivers, and any portion of the coast in the included area within 50 yards of the high water line.

40 **Port regulations.**—See Appendix I., pages 470-474.

General charts 2403, 2757, 3543.

Chart 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

Outer shoal, situated $1\frac{1}{4}$ miles south-eastward of the south end of the South mole, a detached rubble breakwater, is, within the 5-fathoms contour line, about $1\frac{1}{2}$ miles long in a north-east and south-west direction, and from one to 4 cables broad, having over it general depths of 4 to 5 fathoms, mud and sand bottom; there are patches of $3\frac{1}{2}$ to $3\frac{3}{4}$ fathoms at the south-western extremity, and two heads of 5 fathoms close together at about 2 cables north-westward of that extremity, in the examination anchorage. From the least depth, $3\frac{1}{2}$ fathoms, the south end of the South mole, bears 325° true, distant $1\frac{1}{10}$ miles. 5 10

A shoal, about one cable in diameter, with a least depth of $4\frac{1}{2}$ fathoms, is situated 3 cables south-westward of the south extremity of Outer shoal. The shoals westward are described with St. John islands. 15

Clearing marks.—Fort Canning lighthouse, in line with the clock-tower at Telok Ayer fish market, bearing 345° true, leads westward of Outer shoal, and of the shoal just mentioned, south-westward of it.

The whole of Fort Canning hill open eastward of the Victoria Memorial hall leads eastward of Outer shoal. 20

Mount Serapong, bearing 280° true, leads midway between the southern edge of Outer shoal and the shoal of $4\frac{1}{2}$ fathoms situated south-westward of it.

Malay point and spit, situated northward of the sunken hulks eastward of Tanjong Pagar, is mostly absorbed by the reclamation of the land on which are numerous godowns, the conspicuous Incinerator chimney, and other buildings, as charted. A tongue of the spit with depths of $2\frac{1}{4}$ to 3 fathoms extends about half a mile north-eastward of the outer end of the new pier eastward of Tanjong Pagar. 25 30

Buoy.—A red conical buoy, surmounted by a staff and ball, marks the edge of the 3-fathoms contour line fronting Malay spit, about $1\frac{3}{4}$ cables, 107° true, of the north-east corner of the reclamation. 35

Telok Ayer.—On what was Malay point are the Palmer godowns, and within is Mount Palmer (being removed). The land is being further reclaimed northward, parallel to Raffles quay, as charted, in the direction of Johnston's pier, with a camber about midway, dredged to a depth of 7 feet, apparently known as Telok Ayer; the outside quay will have a depth of about 18 feet alongside, and is protected from easterly winds by the South mole below described. 40

Johnston's pier, situated about a cable southward of the river entrance, affords landing for boats at all times of tide.

General chart 2403.

Chart 1995, Singapore road. Var. $0^{\circ}3' E$.

Lights.—A light is shown at each end of the crosshead of Johnston's pier; other lights at the Master attendant's pier northward of it, and at the south point of entrance to the river.

- 5 **Singapore river** is barred by a flat with a depth of about 3 feet over it at low water, which fronts the shore to a distance of 2 cables with less than 6 feet water. Several bridges span the river, the lower one, at the mouth, being Anderson bridge, and the next above it Cavanagh bridge. The river is always crowded with cargo
10 boats, the central part being kept dredged and clear for those under way. For the town, *see* page 279.

- South mole.—Inner harbour.**—A rubble breakwater, which extends in a 23° true and 203° true direction for 1,700 yards, fronts the reclamation ground between Johnston's pier and Malay
15 point at a distance of about $3\frac{1}{4}$ cables from the extended sea front, forming Telok Ayer. The space westward of this mole, known as the Inner harbour, is dredged to a depth of 20 feet at low water springs, near its centre, and provides accommodation for the smaller cargo and passenger vessels. The entrances have depths of about 17 to
20 18 feet at low water springs. Vessels must not anchor within a distance of 2 cables of the extremes of the mole.

See Port regulations, Appendix I., pages 470-474.

Lights.—The South mole is marked by lights at each extremity, shown from masts with a crossyard.

- 25 **Tanjong Rú** (*Lat. $1^{\circ} 18' N$, Long. $103^{\circ} 52' E$*).—At about $8\frac{1}{2}$ cables northward of the north extreme of the South mole, with the approach to Singapore river and that portion of the town northward of it between, is Tanjong Rú, the western extreme of the peninsula, about one mile in length, forming, with Tanjong Katong eastward of
30 it, the northern shore of Singapore road; it is separated from the western shore of the bay by a channel a quarter of a mile wide, with a depth of 2 to 3 feet at low water, spring tides.

- Beacon.**—A red skeleton beacon, surmounted by a ball, and numbered "26," is erected about $1\frac{3}{4}$ cables westward of Tanjong Rú,
35 near the edge of the drying bank of mud and sand extending from that point.

- Within Tanjong Rú is an extensive shallow lagoon, known as Sungi Gelang, a convenient anchorage for boats and native craft, many of which may be seen there at certain seasons. There are
40 several European workshops and small repairing yards for local craft on Tanjong Rú. For patent slip, *see* Appendix II., page 475.

Southward of Tanjong Rú is the anchorage for old vessels for sale and craft undergoing extensive refits.

General chart 2403.

Chart 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

Tanjong Katong forms the north-eastern boundary of Singapore road; it is low, and covered with cocoanut trees, hotels, bungalows, the coastline being studded with bathing enclosures.

The shoals off-shore have been mentioned with the description of Singapore road; they extend about 8 cables off, or nearly to the edge of the 5-fathoms contour line. 5

Fishing stakes extend nearly off to that contour.

Obelisk.—An obelisk, which marks the harbour limit in this direction, stands about one cable westward of Tanjong Katong, and farther westward is a small iron pier. 10

LIGHT.—A light is shown from a white steel tower on Fort Canning, at an elevation of 202 feet above high water. For limits of sectors, see Light list and charts.

Signal station.—There is a signal station at Fort Canning. For details, see page 273. 15

From the signal station the approach of all vessels is signalled, and mail signals and local signals displayed; the codes can be obtained from the Master attendant's office, near the mouth of the river.

Time signals are made from Fort Canning, and from Mount Faber, Keppel harbour. 20

Each signal consists of a ball, hoisted as preparatory at about 0h. 55m. p.m., and dropped daily by electricity at 1h. 0m. 0sec. mean time of the 105th meridian, equivalent to 18h. 0m. 0sec. Greenwich mean time. 25

When the time signal ball at Fort Canning or at Mount Faber fails to drop correctly, the flag W. will be hoisted at the Time signal mast, and the ball lowered slowly by hand about 5 minutes after 1h. p.m., but it will be again hoisted at about 1h. 55m. p.m., and dropped at 2h. p.m.; should it fail a second time, the flag W. will be again hoisted. 30

Should the time ball be under repair, the flag W. will be kept flying until the repairs are completed.

An electric time bell for the use of shipping is fitted in the Wharf Superintendent's Office, Tanjong Pagar. This time signal is in connection with the Observatory standard clock, and rings automatically at every hour of Greenwich mean time. Chronometer comparisons may be obtained by applying at the above office. 35

ANCHORAGES.—The trade of Singapore is so considerable that a number of vessels will always be found anchored in the road within the harbour limits; small vessels may run in, guided by their 40

General chart 2403.

Chart 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

soundings, and anchor where they can find a convenient berth, or proceed into the harbour within the South mole.

- 5 Vessels of deep draught will find good anchorage off the town between Outer shoal and the 5-fathoms contour line, with Fort Canning lighthouse bearing from 310° to 338° true, mud and sand bottom. See Port regulations, Appendix I., pages 470-474.

- Vessels of war.**—The anchorage reserved exclusively for vessels of war is with Fort Canning signal station flagstaff bearing 308° true, and except with special permission no merchant vessel must anchor so as to swing within half a cable of this line of bearing.

During the sea breeze, a choppy sea gets up, especially on the ebb, rendering it dangerous for boats coming alongside.

- Anchor buoy.**—A conical red buoy, with ball, marks the 15 5-fathoms contour line on the above bearing. This buoy is occasionally dragged from its proper position, but is replaced by the Harbour authorities with as little delay as possible.

- Quarantine anchorage.**—The quarantine anchorage is northward of, and from between 7 and 12 cables of, Peak island, with the summit of that island bearing from 201° to 152° true, avoiding the patches of $2\frac{1}{2}$ to $4\frac{1}{2}$ fathoms in the western part of these limits if necessary.

Examination anchorages.—See page 269.

- DIRECTIONS.—From the westward.**—When bound to 25 Singapore road from the westward, and having rounded Peak island at the distance of about $2\frac{1}{2}$ cables, in a vessel of deep draught, should steer in with Fort Canning lighthouse in line with Telok Ayer fish-market clock tower bearing 345° true, through the quarantine and examination anchorages, in not less than $5\frac{1}{2}$ fathoms at low water 30 springs, until the south extreme of Blakang Mati bears southward of 235° true, then steer north-eastward for the desired anchorage, if not compelled to wait in either of those above mentioned.

- Vessels of light draught from abreast and eastward of Peak island may steer direct for the road over Outer shoal, observing that the 35 depth is $3\frac{1}{2}$ fathoms only at low water on the western part, and from 4 to $4\frac{1}{2}$ fathoms over the remainder.

- At night.**—Vessels with local knowledge can enter by the southern approach eastward of Peak island, by steering for Fort Canning light, showing *occulting red*, bearing 345° true, observing 40 that the eastern limit of the *red* sector leads over the shallowest spot, $3\frac{1}{2}$ fathoms, on Outer shoal. From the eastward, Fort Canning light

General charts 2403, 2757, 3543.

Chart 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

between the bearings of 274° and 300° true will lead in north-eastward of Outer shoal in not less than 6 fathoms. These remarks are taken from the chart.

In working in the day time towards the dangers between St. John islands and Blakang Mati, care must be observed not to bring Peak island to bear eastward of 168° true, while Mount Serapong bears northward of 292° true, to avoid the patches on the west side of Quarantine anchorage; but when Mount Serapong is westward of that bearing, a vessel may stand on until the western extreme of West St. John island bears 195° true.

The shoalest spot on Outer shoal will be avoided by not bringing Peak island westward of 184° true, after the south extreme of Blakang Mati bears 282° true. The south extreme of Blakang Mati, if not brought westward of 248° true, will lead northward of Outer shoal; and vessels not wishing to stand over this shoal, when outside or southward of it, should not bring the south extreme of Blakang Mati southward of 260° true.

From the eastward.—Small vessels bound to Singapore road from the eastward will have no difficulty, as they have merely to proceed to a convenient anchorage. Vessels of less than 15 feet draught may pass within the banks off Tanjong Katong, by keeping in the run of deep water, fairly close to the end of the lines of fishing stakes which extend out from that point.

It is the usual custom for sailing vessels belonging to the port, to keep these banks well aboard when proceeding to the anchorage from the eastward, when the wind is off the land and the tidal stream setting to the westward.

Vessels of heavier draught should keep well outside those banks, and with Mount Serapong bearing about 242° true, which bearing leads to the anchorage; or to avoid getting under a depth of 6 fathoms.

SINGAPORE (*Lat. $1^{\circ} 17' N.$, Long. $103^{\circ} 51' E.$*).—The town of Singapore is built on each side of Singapore river, which is a small stream, only navigable for small craft.

The commercial part of the town is situated on the south side of the river, the banks on either side being lined with quays and godowns for the landing and reception of merchandise.

The river is always crowded with cargo boats, the central parts being kept dredged and clear of those under way; several bridges span the river, the western of them, at the mouth, being Cavanagh bridge, and the eastern Anderson bridge.

Singapore is a free port, and there are no harbour or tonnage dues. The Post office, Harbour office, and European club are erected on the south entrance point, and several conspicuous buildings stand on re-

Chart 1995, Singapore road. Var. $0\frac{3}{4}^{\circ}$ E.

claimed ground on the sea front southward of them. Among the most conspicuous objects in the vicinity, when seen from seaward, is the Victoria Memorial hall, a yellow stone building, surmounted by a dome and clock-tower, the clock being illuminated at night; the crown surmounting this building is 188 feet above high water, and conspicuous when approaching from the eastward.

From the open square in front of the Victoria Memorial hall a fine esplanade extends for a quarter of a mile along the sea front; behind this esplanade is situated the Recreation ground fronting St. Andrew's cathedral, which has a tower surmounted by a spire 214 feet high.

Other conspicuous objects are Guthries tower, surmounted by a dome 135 feet high, Signal station, Time ball and Saluting battery, all situated on the summit of Fort Canning hill, which rises abruptly above the centre of the town to a height of 156 feet.

Dalhousie obelisk has been moved to a position 300 feet south-eastward of the Victoria Memorial clock-tower, and being hidden from seaward by trees is no longer available as a clearing or anchoring mark.

Hospitals.—The large hospital has 10 beds in the officers' and 50 in the seamen's wards; the hospital for contagious diseases is on St. John island. The sailors' home accommodates 95.

SINGAPORE STRAIT—EASTERN PART.

Chart 2403, Singapore strait.

SOUTH SHORE.—The eastern part of Singapore strait eastward of the Sambu islands (page 246) is formed by Pulo Batam, an island of considerable size lying on the west side of the north entrance to Rhio strait, and by Pulo Bintang, a larger island on the east side of Rhio strait.

BATAM BAY (*Lat. $1^{\circ} 10' N.$, Long. $103^{\circ} 57' E.$*) lies close eastward of the Sambu islands, and is $6\frac{1}{2}$ miles wide, between them and Tanjong Sengkuwang to the eastward.

The depths in the outer part of the bay vary from 10 to 20 fathoms; but close to the shore reefs are depths of 6 to 7 fathoms, so caution is necessary when working towards them.

Three small streams fall into the bay: the Mentarau, Ladi, and Jodu; the two latter are separated by Tanjong Oma.

Pulo Dongas, on the south shore of Batam bay, lies close to the point situated $1\frac{1}{4}$ miles eastward of Tanjong Pingi; with a coral reef the whole distance between. The bight between this islet and Pulo Bokor is free from danger, and vessels may anchor there in $4\frac{1}{2}$ fathoms water.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Pulo Bokor (*Lat. $1^{\circ} 9' N.$, Long. $103^{\circ} 58' E.$*), 4 cables in diameter, lies about that distance off Tanjong Liengsi; it is encompassed by the coral reef projecting from the shore, and which extends about $1\frac{1}{2}$ cables beyond it.

Jodu bay is the name of the anchorage eastward of Pulo Bokor, and off the entrances to Sungi Jodu and Ladi. A reef, dry at low water, lies three-quarters of a mile off the peninsula separating the two streams, or about 4 cables off the shore reef which fringes the whole coastline from Tanjong Sengkuwang to Pulo Bokor, and obstructs the mouths of all the streams.

Vessels may anchor in about $4\frac{1}{2}$ fathoms with Pulo Bokor bearing 135° true, distant about half a mile. The depths decrease suddenly from 6 to 3 fathoms towards the island, but more regularly towards the reefs on the eastern side of the bay.

Tanjong Sengkuwang and Sikwang point are the north-west and north-east extremes of a peninsula which separates Batam and Bulang bays. The land in the vicinity consists of moderately elevated hills, and the coastline is fringed with coral extending from one cable to 2 cables off, near the edge of which are irregular depths of from 6 to 10 fathoms.

TELOK BULANG or TERING is $2\frac{3}{4}$ miles wide, between Tanjong Sengkuwang and Tanjong Bekapur, and 4 miles in length. The shore reef extends nearly a mile in places on the west side of the bay with a fringe of mangroves; on the eastern side, where the shore reef extends about 2 cables, there is a depth of 3 fathoms so far in as Tanjong Sambau, and southward of this the bay again widens and is shallower with drying patches and two low, wooded islets, named Pulo Sembakau Besar and Pulo Sembakau Kechil, near its head.

The streams, which empty into the bay, are barely navigable for small craft.

A detached reef, part of which dries 3 feet, lies on the west side of the entrance of Bulang bay, with its outer edge situated 98° true, distant one mile from Tanjong Sengkuwang.

Anchorage.—The best anchorage is on the east side of the approach, in 6 fathoms water, about a mile 242° true from Pulo Nongsa; small vessels may go farther in.

Pulo Nongsa (*Lat. $1^{\circ} 12' N.$, Long. $104^{\circ} 5' E.$*), one-third of a mile in extent, and surrounded by reef, lies about half a mile off Tanjong Bela shore reef; it is rocky, wooded, and 65 feet high; on the south edge of the reef is a sand-cay, overgrown with low trees; between it and the shore reef are depths of 5 to 10 fathoms. A ridge, with less than 3 fathoms water, extends about 4 cables eastward of the island.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Rosa rock, nearly one mile, 80° true, from Pulo Nongsa, and 2 cables northward of the shore reef extending from Tanjong Burong, dries at low water, with a depth of 10 fathoms close to its north side.

5 **Tanjong Burong, or Nongsa** (*Lat. $1^{\circ} 12' N.$, Long. $104^{\circ} 6' E.$*), is the northernmost point of Pulo Batam, and at half a mile south-westward of it is the Nongsa stream, on which is the village of the
 * same name. The channel of this stream, between the coral reef which extends northward about three-quarters of a mile from the shore, has
 10 a depth of a quarter of a fathom, but inside the depths are from one fathom to $1\frac{3}{4}$ fathoms; there are several villages on this part of the coast. Eastward of the point the shore reef, to the entrance to Rhio strait, projects three-quarters of a mile in places, and is marked by fishing enclosures.

15 **Rhio strait** north entrance, lying between Tanjong Burong and Tanjong Sebong, and the dangers between them, are described in Vol. II. Vessels should not stand southward of the line of Pulo Nongsa bearing 274° true.

Light.—A light is exhibited on Pan reef, in the fairway of the
 20 entrance to Rhio strait.

PULO BINTANG is the largest island on the south side of Singapore strait, its north side being about 16 or 17 miles in length, in an east and west direction, the greater part being taken up by Telok Sumpat; several dangers lie off the island, which will be described in
 25 detail. Like most of the other land forming Singapore strait, it is covered with trees, and, excepting the hills inland, is not much elevated.

Vessels should not venture within the 10-fathoms contour line as the depths are very irregular, with shallow patches which are difficult to
 30 approach by the lead, though they may frequently be distinguished by tide-rips.

Bintang Great and Little hills.—Bintang Great hill is situated about $6\frac{1}{2}$ miles within the northern coast of the island, and may be seen in clear weather from a distance of about 40 miles,
 35 being 1,253 feet high, and a good mark in approaching the entrance of Singapore strait from the northward. When viewed from that direction, it shows a saddle-shaped summit, and appearing to adjoin it on the north side, but in reality 3 miles distant, is a conical hill, named Bintang Little hill or Bukit Kidyang, 792 feet high. See
 40 view *b* on page 297.

Tanjong Pergam (*Lat. $1^{\circ} 11' N.$, Long. $104^{\circ} 21' E.$*) lies $1\frac{1}{2}$ miles eastward of Tanjong Sebong, and a hill, just over it, is 298 feet high; the shore reef extends off only a short distance, but a

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

group of islets, or large rocks, half a mile in extent, lies 4 cables off the point.

Pulo Pergam lies half a mile south-west of it with several rocks above water extending nearly a mile beyond. 5

Lagoi reef, or Melang Tekanjong, lying between $1\frac{1}{2}$ and 2 miles, 37° true from Tanjong Pergam, has a rock with less than 6 feet on its north and south extremes; at 7 cables south-west of it is another shallow patch.

Between Lagoi reef and the shore are other shoals, the principal 10 being the Manjang reef, a narrow ridge half a mile in length.

The whole of Pulo Sekera, well open of Tanjong Sebong, bearing 227° true, leads three-quarters of a mile north-eastward of these dangers.

Tanjong Batu Sau, or Tanjong Sambang (*Lat. $1^{\circ} 12' N.$, 15 Long. $104^{\circ} 23' E.$*), a prominent point on the north coast of Bintang, having a hill over it, lies $2\frac{1}{2}$ miles eastward of Tanjong Pergam. The coast to the eastward as far as Peak islet, is fronted by reef to the distance of one-third of a mile, with several rocks above water.

Between Tanjong Batu Sau and Tanjong Said, a bluff 2 miles west- 20 ward, is a bight about one mile in extent, its shores being fronted by a reef, with rocks above water, to the distance of about half a mile.

Anchorage.—Small vessels may temporarily anchor in about 4 fathoms in the middle of this bight, avoiding Lagoi and Manjang 25 reefs already described.

Diana shoals lie between 4 and $5\frac{1}{2}$ miles east-north-east from Lagoi reef; they comprise several shallow ridges of sand and stones, having a general east and west direction. The northernmost patches of $2\frac{3}{4}$ fathoms lie about 17° true, distant $2\frac{1}{2}$ miles, from Peak islet. Vessels should keep outside the 10-fathoms contour line. 30

Between Lagoi reef and Diana shoal are several patches, on which not less than $3\frac{1}{4}$ fathoms has been found, also between Diana shoal and the shore, at a distance of three-quarters of a mile from the latter, are more isolated rocks.

The north extreme of Tanjong Brakit bearing southward of 99° 35 true, leads northward of Diana shoals.

TELOK SUMPAT lies between Tanjong Sading and the western extreme of Tanjong Brakit, $9\frac{1}{2}$ miles distant. Its head and eastern part, where lies Pulo Sumpat, is fronted by coral reefs to distances of from one mile to $1\frac{1}{2}$ miles; the depths in the anchorage 40 are from 7 to 10 fathoms. See view c on page 297.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Pulo Sumpat, a rocky, wooded island, 221 feet high, lying in the eastern part of Sumpat bay, just outside the edge of the shore reefs, may be readily known by its saddle shape.

- 5 Two wooded rocks lie on the coast reef eastward of Pulo Sumpat, and southward of the islet, near a small fresh-water stream, is Sumpat village.

● About a mile to the eastward of Pulo Sumpat is a narrow creek, named Sungai Beru; it has two villages near the entrance, and is
10 navigable for boats at high water, but is soon lost in mangrove swamps.

Dangers.—A rock of small extent, with a depth of $2\frac{3}{4}$ fathoms, lies near the centre of the bay with Pulo Sumpat summit bearing 136° true, distant $2\frac{8}{10}$ miles.

- 15 A patch, with a depth of $3\frac{1}{2}$ fathoms on it, and 6 to 8 fathoms around, lies $1\frac{1}{2}$ miles southward of the above, with Pulo Sumpat bearing 108° true, distant 2 miles.

A reef, consisting of sand and stones, about 4 cables in length, with a depth of $1\frac{1}{2}$ fathoms at the northern end, lies with the north extreme of Tanjong Brakit bearing 90° true, distant $2\frac{4}{10}$ miles.
20

TANJONG BRAKIT (Berakit), the north-east point of Pulo Bintang, has some hills on its east side, one of which is 217 feet high, and others at one mile farther to the southward, with one 267 feet high; some trees grow straight up on the point. Reefs and
25 foul ground extend from one mile to $1\frac{3}{4}$ miles off this point.

Pulo Brakit (Berakit), 40 feet high, to the tops of the trees, small, and wooded, stands on the shore reef, at half a mile northward of Tanjong Brakit; the reef is here covered with large stones, several of which uncover at half tide.

- 30 Black rock is situated one-third of a mile westward of the island, on the shore reef, and is visible at high water.

Pulo Kuku, 40 feet high, is narrow, and three-quarters of a mile in length; it lies close-to and appears to form the eastern side of Tanjong Brakit.

- 35 **Tanjong Lokan**, the east point of the peninsula, is situated $1\frac{1}{2}$ miles southward of Pulo Kuku, fronted by reef to a short distance. From thence southward to Double Tree hill the coast reef extends one-third of a mile off in places, but there are no outlying reefs.

For **coast southward**, see Vol. II.

- 40 **Postillion reef**, composed of coral and sand, with a depth of 2 fathoms, lies with Pulo Brakit in line with the north point of Pulo Kuku, bearing 129° true, and 8 cables outside the reef extending

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

from Tanjong Brakit, with depths of 4 to 5 fathoms between. Patches of 4 fathoms extend more than half a mile from this reef in a north-west direction.

Several coral patches of from $2\frac{3}{4}$ to $3\frac{3}{4}$ fathoms extend southward 5 from the reef for the distance of a quarter of a mile, and depths of from 3 to 5 fathoms for three-quarters of a mile north-eastward of it.

Brakit (Berakit) rock (*Lat. $1^{\circ} 16' N.$, Long. $104^{\circ} 35\frac{1}{2}' E.$*), one cable in length by half a cable in breadth, has a least depth of 3 feet, with Pulo Brakit bearing 217° true, distant $2\frac{1}{2}$ miles. 10

A coral patch, with a depth of $3\frac{1}{2}$ fathoms, is situated three-quarters of a cable north-westward of Brakit rock; the bottom is irregular.

Clearing marks.—The eastern summit of Bintang Great hill in line with the north-west extreme of Tanjong Brakit, bearing 211° true, leads westward of Brakit rock. 15

A conspicuous double tree, on a hill 4 miles southward of Tanjong Lokan, kept well open of Tanjong Lokan, bearing 192° true, leads eastward of it, and Horsburgh lighthouse, in line with the highest coast hill on Tanjong Penyusuh, bearing 285° true, leads northward.

CAUTION.—From the above description it will be seen that the whole of the north coast of Pulo Bintang is fronted with dangers, and it is advisable that vessels should not attempt to come inside Diana shoal and Lagoi reef; these will be guarded against by keeping Pulo Sekera well open of Tanjong Sebong, bearing 227° true, until the north extreme of Tanjong Brakit bears 97° true. Pulo Sumpat, bearing 165° true, will lead westward of the shoals in the vicinity of Pulo Brakit. 20 25

Tides.—It is high water, full and change, at Tanjong Brakit, at XIh.; springs rise about 12 feet, neaps 9 feet.

NORTH SHORE OF THE STRAIT.—Aspect.—The north shore of the eastern part of Singapore strait is formed by the south-east part of Singapore island, Johor shoal, and Tanjong Penyusuh, the south-east part of the Malay peninsula. The Rumenia islands, with several rocks and dangers near them, together with Rumenia shoals, North patch, and Eastern bank, extend eastward of Tanjong Penyusuh nearly as far as the meridian of Tanjong Brakit on the opposite shore. These outlying dangers will be described in detail; but the following hills, as they form convenient landmarks for navigating the strait, and for recognising the entrance from the eastward, will be first mentioned. See view on top of chart 2403. 30 35 40

Johor hill, or Gunong Pengerang, or Lanyut (*Lat. $1^{\circ} 23' N.$, Long. $104^{\circ} 6' E.$*), 661 feet high, is of a regular oblong, sloping form; it has been cleared of wood except a small clump on the

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Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

top, and planted with rubber trees. Standing but a short distance inland from Tanjong Johor, the south-west point of the Malay peninsula, it is one of the most conspicuous objects in Singapore strait.

- 5 **Little Johor hill or Gunong Belungkar or Bau,** 749 feet high, lies about 5 miles northward of Johor hill.

Barbukit, 638 feet high, situated 5 miles north-westward of Tanjong Penyusuh, is a regular pyramid rising from the low land, and a useful object in making the strait from the northward. Its top
10 has been cleared of wood, with the exception of one conspicuous tree about 120 feet high.

Bukit Stijam, or Tuatow, formerly known as False Barbukit, is 455 feet high to the tops of the trees, and situated near the coast, 6 miles north-eastward from Barbukit; it has a group of trees on
15 its summit, a little more elevated than the coast, which is all rather low and wooded to the northward of the hills over Tanjong Penyusuh. It being discernible during hazy weather much sooner than Barbukit, renders it a useful mark when approaching Singapore strait from the northward. See view c on page 297.

- 20 **EAST COAST of SINGAPORE ISLAND.**—From Tanjong Katong (page 277), the north-east limit of Singapore road, the coast trends north-eastward about 5 miles to Tanjong Bedok or Mengkuang; about midway between is the village of Siglap. Just to the northward of Tanjong Bedok there is a slight indentation in the coast-
25 line, known as Telok Mata Ikan.

Red cliffs.—The south and south-east coasts of Singapore island are level and wooded. The most conspicuous objects are the small Red cliffs named Tanah Merah Kechil, in a bight south-westward of Tanjong Bedok, and the large Red cliffs or Tanah Merah Besar, 3 miles
30 north-eastward of them. The large Red cliffs are visible from a considerable distance.

Tanjong Changi (*Lat. $1^{\circ} 23\frac{1}{2}'$ N., Long. $104^{\circ} 0'$ E.*), the north-east extreme of Singapore island, is low land with a white sandy beach, and forms the south-east limit of the Old strait of Singapore.
35

Red Cliff bank and shoals form an extensive flat of mud and sand, with some patches of rock and coral, extending from the eastern part of Singapore island, between Tanjong Bedok and Tanjong Changi; its apex with a depth of 3 fathoms, is 3 miles eastward of the
40 large Red cliffs; the depth is one fathom and less half-way to the shore.

Buoys.—A red conical buoy, surmounted by a staff and cage, is moored in 7 feet water, about 8 cables, 96° true, from a rock which

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Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

dries on the bank; and a white conical buoy, surmounted by a staff and cage, lies in 7 feet water 3 cables eastward of the red buoy.

Small craft approaching Kwala Johor from the westward should keep Pulo Tekong Kechil midway between the buoys, bearing about 7° true, which mark leads clear of all dangers southward of them. 5

Johor shoal, fronting Kwala Johor, the east entrance of the Old strait of Singapore, is about 2 miles in length in an east and west direction, nearly a quarter of a mile in breadth, and composed of hard sand, having $1\frac{1}{4}$ fathoms least water, and 2 to 3 fathoms elsewhere. Depths of less than 5 fathoms extend about one mile to the eastward, increasing rapidly beyond; there are patches of 2 to 3 fathoms to the westward, between it and Red Cliff bank. Near its southern side are depths of from 8 to 9 fathoms. 10

From a depth of $2\frac{3}{4}$ fathoms on the east extreme of the shallow portion of Johor shoal, distant $5\frac{1}{2}$ miles from the east part of Singapore island, Johor hill bears 29° true, distant about $4\frac{1}{4}$ miles. 15

Clearing marks.—South Lima island open of South point bearing 75° true, leads southward of Johor shoal. Little Johor hill bearing westward of 350° true, leads eastward of it. 20

At night, Fort Canning light in sight bearing northward of 270° true, will lead about one mile southward of Johor shoal.

Kwala Johor lies between the dangers extending over one mile southward from Tanjong Johor, on the east, and Johor shoal and Red Cliff bank, on the west. It is about $2\frac{1}{2}$ miles wide abreast of Johor shoal, with irregular depths of $5\frac{1}{2}$ to 13 fathoms in the fairway, decreasing towards Tanjong Johor. 25

Between Red Cliff bank and the bank extending southward from Pulo Tekong Besar the channel is about $1\frac{1}{2}$ miles wide, with irregular depths of from 7 to 13 fathoms; farther in between Pulo Ubin bank, which extends one mile south-eastward of the island of that name, and Pulo Sijahat and Pulo Tekong Kechil, the breadth is but three-quarters of a mile, with depths of from 7 to 12 fathoms. 30

Sungi Johor is navigable, apparently, for vessels of moderate draught in charge of a pilot to Johor Lama, a distance of about 10 miles. 35

Johor Lama, the old capital of Johor, was once a place of considerable trade, but it has been supplanted by Johor Bahru, the present seat of Government, and residence of the Sultan (Chart 2757, page 301); it contains about 20,000 inhabitants, chiefly Chinese. 40

Water.—Good water may be procured here, but nothing else.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Coast.—Tanjong Johor (*Lat. $1^{\circ} 22' N.$, Long. $104^{\circ} 5' E.$*) is the bluff promontory forming the eastern side of the entrance of Kwala Johor, and of the Old strait of Singapore.

5 **Malang Berdaun**, a group of rocks, one of which is several feet above high water, lie about three-quarters of a mile south-eastward of Tanjong Johor, within the edge of the drying bank, which here extends three-quarters of a mile from the coast. Shallow water extends a distance of 2 cables outside it. Between Malang Berdaun
10 and Tanjong Sitapa, $2\frac{3}{4}$ miles south-eastward, the bank dries off about 4 cables, and the depths decrease suddenly from 7 to 4 fathoms towards the bank.

Clearing mark.—Little Johor hill, bearing 356° true, will lead westward of Malang Berdaun, and South point open of Tanjong
15 Sitapa, bearing 95° true, will lead southward.

Pulo Tekong Besar, and Pulo Tekong Kechil, are two islands lying north-westward of Tanjong Johor at the entrance of Sungai Johor, dividing that stream into two branches. Pulo Tekong Besar, as its name implies, is the larger island of the two, being $3\frac{1}{2}$ miles in length
20 in an east and west direction, and $2\frac{1}{4}$ miles in breadth north and south.

Pulo Tekong Kechil, or Little Tekong, lying close to the west side of the larger island, is nearly round, its diameter being about two-thirds of a mile. There is an islet named Pulo Sidyongkong lying close to
25 the south-east side of Pulo Tekong Besar; and another, named Pulo Sijahat, consisting of three rocks covered with vegetation, at three-quarters of a mile to the southward of Pulo Tekong Kechil.

A rock awash, having 6 fathoms close-to, lies 2 cables north-westward of Pulo Sijahat, on the channel edge of the bank which surrounds both the Tekong islands; this bank is steep-to in places, and
30 extends $1\frac{1}{2}$ miles southward of Pulo Tekong Besar and $2\frac{1}{2}$ miles northward of Tekong Kechil.

Kapala rocks appear to be three rocky heads awash, the outer one lying 163° true, distant $1\frac{1}{2}$ miles from the south point of Pulo
35 Tekong Kechil; the shoal, with depths under 3 fathoms, extends 6 cables south-eastward of that rock.

Directions.—In approaching Kwala Johor from the eastward, Tanjong Changi should be steered for bearing 302° true, which leads in the fairway eastward of Johor shoal and of Red bank, in not less
40 than 8 fathoms, until within one mile of the point, or Pulo Sijahat is in line with the south extreme of Tekong Kechil; then course should be altered to 343° true, until Johor hill is in line with the eastern Kapala rock bearing 100° true, which mark kept astern will lead into Old strait southward of Pulo Ubin flat. (For Old strait, see page
45 300.)

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Should a vessel wish to proceed up Johor river, it would be advisable to obtain the assistance of a pilot.

Calder harbour is the space between Pulo Tekong Besar and the mainland eastward of it, northward of Tanjong Johor. The breadth of the harbour, between the banks on either side, is three-quarters of a mile, with anchorage in depths of 5 to 8 fathoms. Sungai Santi enters the harbour on its eastern side, with a depth of about one fathom, deepening within; it takes its rise near Barbukit hill. 5

COAST.—Tanjong Sitapa (*Lat. $1^{\circ} 20' N.$, Long. $104^{\circ} 8' E.$*), lying $3\frac{1}{4}$ miles east-south-eastward from Tanjong Johor, is a somewhat prominent point. The 3-fathoms edge of the shore bank is half a mile distant from Tanjong Sitapa and from the shore eastward to South point, and should not be approached under a depth of 7 fathoms. 10 15

South point, or Tanjong Tehimpang, the most southern point of this part of the Malay peninsula, lies nearly 4 miles eastward of Tanjong Sitapa, with Tanjong Tiram between; the 5-fathoms contour line is about half a mile off South point.

A solitary tree, conspicuous, especially when seen from the westward, is situated on this point. 20

Tanjong Rumenia lies nearly 2 miles eastward of South point; Sungai Kalarang, a small stream, is immediately westward of it. The 3-fathoms edge of the shore bank is rather more than half a mile off Tanjong Rumenia, but from the head of the bight, between it and Tanjong Penyusuh, it extends $1\frac{1}{4}$ miles off. 25

Pulo Rumenia, or Water island, about half a mile north-eastward of Tanjong Rumenia, is a round island, 106 feet high, and about a quarter of a mile in extent, with an islet 50 feet high off its south-west part connected to it by a reef, both standing on the shore bank. 30

Diana cove.—Close westward of the south-west extreme of Tanjong Penyusuh, is Diana cove, with a depth of about one fathom.

Anchorage.—There is good anchorage off Diana cove in 9 fathoms, stiff mud and excellent holding ground, with South Lima island bearing 57° true, and South point 272° true, with Tanjong Sitapa just shut in. 35

Water.—There is a stream of fresh water in Diana cove, and water may be procured in the sandy bays on either side of it. Within Water island to the westward there is a good stream upon the mainland, where fresh water may be obtained with facility in either monsoon; but in the north-east monsoon the eastern streams are more convenient. 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Good water can also be procured from the stream close round the rocky point, about 6 cables northward of Tanjong Penyusuh.

Tanjong Penyusuh (*Lat. $1^{\circ} 22' N.$, Long. $104^{\circ} 17' E.$*), the south-east extreme of the Malay peninsula, and the north side of the eastern entrance to Singapore strait, is level land covered with trees, with some small hills behind. Coral reefs extend off from one cable to 3 cables, with Lima islands in the offing.

The highest coast hill in this vicinity, 329 feet high, is situated within Diana cove, at $1\frac{2}{10}$ miles westward from this point.

Tides.—At Tanjong Penyusuh, it is high water, full and change, at Xh. 30m.; springs rise 12 feet, neaps 9 feet.

Tanjong Pungei lies about 4 miles northward of Tanjong Penyusuh; its summit is conspicuous, being wooded, and 202 feet high to the tops of the trees. The bay between has depths under 3 fathoms to beyond a line joining the points.

Pulo Pungei, a wooded island, is situated $1\frac{1}{2}$ cables southward of the point, and is 73 feet high to the tops of the trees.

Sungi Pungei lies within the bight, and is approached by a boat channel, navigable except at low water.

Tanjong Stijam lies about $4\frac{1}{2}$ miles northward of Tanjong Pungei, and Bukit Stijam or False Barbukit hill, before mentioned, is 2 miles west-south-westward of Sitajam point.

Foul ground extends three-quarters of a mile off the point, and the bay between the point and Tanjong Pungei, has depths of less than 3 fathoms out to beyond the line joining them.

There is a considerable coast and riverside population, and frequent clearings, but the greater portion of the coast is covered with thick forest.

SINGAPORE STRAIT.—Eastern entrance.—The eastern entrance to the strait lies between Tanjong Penyusuh, off which are the Lima islands, and the Rumenia shoals extending about 13 miles north-eastward of the point on the north, and Tanjong Brakit 19 miles south-eastward of Penyusuh on the south. Near the fairway between these points is Horsburgh, or Pedra Branca, lighthouse, with a deep channel on either side. *See view on top of chart, and those on page 297.* There are several shoal patches south-westward of the lighthouse, described with the fairway dangers later.

Coast.—For the coast northward of Tanjong Stijam, or Sitajam, *see Vol. III.*

LIMA or FIVE ISLANDS, together with many dangers around and amongst them, front Tanjong Penyusuh; they extend nearly 3 miles in a north-north-east and south-south-west direction.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. 0 $\frac{3}{4}$ ° E.

CAUTION.—As no advantage is to be gained by venturing amongst the Lima islands, it is best to consider the whole of the space occupied by them as impracticable for ordinary navigation, and to avoid the locality, passing at least 2 miles outside South Lima island. 5

Clearing mark.—Tanjong Sitapa in line with South point, bearing 274° true, leads southward of all the dangers southward of the Lima islands.

Large island (*Lat. 1° 22' N., Long. 104° 18' E.*), 110 feet high, is the westernmost and largest of the group; it lies three-quarters of a mile off Tanjong Penyusuh, is barely a cable in extent, but is conspicuous from being covered with trees. The islet north-eastward of Large island is wooded and 88 feet high, with the summit cleared except for a single tree; it is about three-quarters of a cable in extent, and situated half a cable from Large island, with which it is 15 connected by a ridge of rocks, drying at low water.

South Lima, 3 cables south-eastward from Large island, is small, 80 feet high, wooded, and being the southernmost of the group is easily recognised.

A rock, 12 feet high, lies near its south point, with a reef of straggling rocks, extending to the eastward, which are bold to approach on the south side. 20

A rock 2 feet high lies about 3 cables south-west of South Lima; and a patch of 3 fathoms at half a mile south-eastward of the rock.

Shoals.—The southernmost danger is a rock with a depth of 2 $\frac{1}{4}$ fathoms, situated with the summit of Large island bearing 26° true, distant 1 $\frac{1}{2}$ miles; a patch of 4 $\frac{3}{4}$ fathoms lies half a mile in a south-easterly direction from this rock. 25

Lima channel.—This channel, between Tanjong Penyusuh and the Lima islands, is used by coasting steam vessels, but as it is narrow and encumbered by shoals, it should not be used without local knowledge. 30

Peak rock, 37 feet high, a barren rock of reddish colour, easily recognised, lies 6 cables eastward of Large island. A patch of 1 $\frac{1}{2}$ fathoms lies north-eastward of it, and patches with depths of 4 and 5 fathoms between Peak rock and Whale rock. 35

Stork reef is about 3 cables in extent, dries 3 feet, and lies about 6 cables south-eastward of Peak rock.

Falloden Hall shoal is about 2 cables in extent, with a depth of 2 $\frac{1}{2}$ fathoms; it is situated 5 $\frac{1}{2}$ cables south of Stork reef, and on the north-west part of a bank, about 1 $\frac{1}{2}$ miles in extent, on which are depths from 7 to 9 fathoms. 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Congalton Skar, a rocky patch with a depth of 5 feet, and 8 to 12 fathoms close-to, is the easternmost of the dangers off the Lima islands. From it Large island bears 268° true, distant $1\frac{8}{10}$ miles.

- 5 When the tidal stream is running to the westward, vessels passing through North channel must be careful that they are not set too near this danger, of which the lead will not give timely warning.

Whale rock, at 7 cables north-east of Peak rock, dries 7 feet; it is a small ledge on which the sea generally breaks, and which is steep-to; the depths around are irregular.

Jones reef, having a depth of one fathom, and 8 to 9 fathoms close-to, lies $2\frac{1}{2}$ cables north-east of Whale rock, with Peak rock bearing 232° true, nearly one mile.

- 15 Between Jones reef and North rock are situated two shoals of $3\frac{1}{2}$ and $3\frac{3}{4}$ fathoms, respectively; these are steep-to, with depths of from 7 to 9 fathoms around.

North island, 104 feet high, and very small, covered with trees, lies 6 cables north-westward from Peak rock, and about one mile off-shore; shallow water extends 3 cables northward of it.

- 20 **North rock**, small, 32 feet high, and with a few bushes on it, is situated 8 cables northward of North island.

A small barren rock, 9 feet high, is situated 3 cables southward of North rock.

- 25 **A reef**, about half a mile in extent, and with rocks above water, lies between North island and North rock. There are several patches between it and North island.

RUMENÍA SHOALS are a number of detached patches of coarse sand and gravel, stretching in a north-easterly direction from the Lima islands, towards North patch. Between these patches are depths of from 8 to 10 fathoms in places; they are steep-to on their eastern and southern sides, there being depths of from 14 to 17 fathoms at a short distance.

- 35 Within a depth of 5 fathoms, these shoals extend $2\frac{1}{2}$ miles in a north-east and south-west direction, and are nearly half a mile wide. The north extreme, in 4 fathoms, lies with Horsburgh lighthouse bearing 167° true, distant $5\frac{3}{4}$ miles, and the south-west extreme lies in the same depth with the lighthouse bearing 144° true, distant $4\frac{1}{2}$ miles. The shoalest spots, with depths of $2\frac{1}{2}$ and $2\frac{3}{4}$ fathoms, over sand and gravel, lies near its centre.

- 40 **Clearing marks**.—The solitary tree on South point, in line with the south extreme of South Lima island, bearing 256° true, leads southward of Rumenía shoals, and Horsburgh lighthouse, in

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

line with the centre of the western slope of Bintang Great hill, bearing 169° true, leads eastward of them in a depth of about 6 fathoms, but a patch of 5 fathoms is situated about one cable on each side of this leading line. 5

This track is only recommended for vessels of light draught proceeding up and down the coast.

Ridge.—Rumenía shoals are connected with North patch by a ridge on which the depths are from 5 to 8 fathoms, with many isolated patches of $3\frac{1}{2}$ to 4 and 5 fathoms; also between Rumenía shoals and the Lima group are similar patches; large vessels therefore should pass eastward of this ridge, and of North patch. 10

A patch of $3\frac{1}{2}$ fathoms lies with Horsburgh lighthouse bearing 187° true, distant $6\frac{3}{4}$ miles.

North patch, lying between $6\frac{1}{2}$ and $7\frac{1}{2}$ miles north-eastward from the shoalest part of the Rumenía shoals is $1\frac{1}{4}$ miles in length, in a north and south direction, with depths of from $3\frac{1}{2}$ to $4\frac{3}{4}$ fathoms. From its north end (*Lat. $1^{\circ} 30\frac{1}{4}'$ N., Long. $104^{\circ} 27'$ E.*) False Barbukit bears 268° true, distant $11\frac{3}{4}$ miles; and Horsburgh lighthouse 193° true, distant $10\frac{3}{4}$ miles. 15 20

The western summit of Bintang Great hill, in line with the foot of the eastern slope of Bintang Little hill, bearing 182° true, leads eastward of North patch, and the shoals to the southward, and between Eastern bank and North patch.

CAUTION.—Mariners are warned that the North channel should not be used for navigation, as no advantage is gained by passing through it, and it is possible that more dangers exist there than are shown on the Admiralty chart. 25

Eastern bank, the outermost of the known banks off Tanjong Penyusuh in the approach to Singapore strait, is nearly 2 miles in extent, with depths of about 8 fathoms, and 11 to 13 fathoms close around. It lies about 6 miles within the range of Horsburgh light, which, from its northern edge, bears about 205° true, distant about 14 miles. 30

PEDRA BRANCA, or White rock, lying in the middle of the eastern entrance of Singapore strait, nearly 8 miles from either shore, is 150 feet in length, 100 feet in breadth, and 24 feet high. It is situated on the western edge of a bank with depths of 6 to 10 fathoms, which extends $1\frac{1}{4}$ miles eastward of it. It will be known by the lighthouse, which was erected on it in 1851, and named after Horsburgh, the celebrated hydrographer, whose labours have in a high degree benefited the interests of navigation and commerce in every part of the eastern seas. 35 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

HORSBURGH LIGHT (*Lat. $1^{\circ} 20' N.$, Long. $104^{\circ} 24' E.$*).

—A light is exhibited on Pedra Branca, from a cylindrical, granite lighthouse, 112 feet in height, and painted black and white in bands,
5 at an elevation of 101 feet above high water. See Light list and charts, also view *d* on page 297.

Anchorage.—During the south-west monsoon small vessels can anchor in a depth of 10 fathoms, hard bottom, but good holding ground, with Horsburgh lighthouse bearing 206° true, distant 2 cables.

10 At this anchorage, during the east-going stream, slack water continues, and during the west-going stream the overfalls are not experienced until the lighthouse bears about 192° true.

Fairway.—Shoals.—A rock which dries 2 feet lies 3 cables, 75° true from the lighthouse.

15 **A patch**, with a depth of $4\frac{1}{2}$ fathoms, and steep-to, lies 4 cables northward of the lighthouse.

Middle rocks, south of Pedra Branca, are of a whitish colour, from 2 to 4 feet high, and stand on the southern edge of the surrounding bank at 6 cables from the lighthouse.

20 **SOUTH LEDGE** consists of three rocks; the northern of which dries 8 feet, the others do not uncover. They are steep-to, depths of from 16 to 20 fathoms being obtained within a short distance, and are almost always marked by heavy tide-rips or the sea breaking over them; from the northern rock Horsburgh lighthouse
25 bears 24° true, distant $2\frac{1}{10}$ miles.

Rocky heads, having depths of 10 fathoms, lie between the lighthouse and South ledge.

Carter shoal is a pinnacle rock with a depth of $1\frac{3}{4}$ fathoms; it is steep-to on its eastern side, and has depths of less than 10 fathoms
30 extending from its western side for a distance of half a cable. It is marked by heavy overfalls. From this rock Horsburgh lighthouse bears 31° true, distant $4\frac{1}{10}$ miles.

To the southward of Carter shoal, at a distance of nearly one mile, are several coral patches, covering an area of over half a mile; the
35 least water is 5 fathoms, which depth is found at 8 cables, 160° true, from Carter shoal.

Several rocky patches, with from 8 to 10 fathoms, are situated about $4\frac{1}{2}$ miles southward and eastward of Horsburgh lighthouse, as charted.

Overfalls.—A bank with depths of 9 to 10 fathoms, about three-
40 quarters of a mile in extent, lies 248° true, distant $5\frac{1}{2}$ miles from Horsburgh lighthouse. It is marked by heavy overfalls, and eddies, the depth, at a short distance from it, being from 14 to 24 fathoms. There are overfalls and eddies between this bank and Carter shoal.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Tides.—It is high water, full and change, at Horsburgh light-house at Xh. 10m. Springs rise $7\frac{1}{2}$ feet, and neaps rise 6 feet.

Tidal streams.—The velocity of the north-eastern or ebb stream is generally greater than that of the south-western or flood streams in both monsoons; when strongest, it runs from 4 to $4\frac{1}{2}$ knots an hour. Neaps run from 2 to 3 knots an hour, but are very irregular. In the strength of the north-east monsoon, when the current runs from the China sea towards Singapore strait, the south-western stream sometimes runs for 10 or 12 hours at a time. 5 10

Again, at about full and change, the north-eastern stream often sets out strong during the night, for 10 or 12 hours together; at other times it is changeable and not strong; it has been sometimes observed to set all round the compass during the night, and once N.N.W. 2 miles an hour directly over Rumenía shoals. (See tidal arrows on the chart.) 15

The following remarks result from the survey made by H.M.S. *Waterwitch* in 1909.

At change of monsoons.—During October and November, at the change of the monsoon, the tidal streams in the eastern part of Singapore strait were found to be irregular as regards their velocity, although very regular in their direction. As a general rule, the maximum velocity occurred four days after full and change, and that velocity was greatest from 2 to 3 hours before high and low water by the shore. In all cases the east-going stream was the stronger for a particular tide. At neaps the velocity was much less than at springs. 20 25

The west-going stream was found to run, with fair regularity, until 2 hours after high water by the shore, and the east-going stream until 2 hours after low water, except on one occasion (towards the end of November, when the N.E. monsoon had set in), when in the 24 hours the west-going stream ran for 15 hours consecutively, with a maximum velocity of $2\frac{7}{10}$ knots, and the east-going stream for 9 hours consecutively, with a maximum velocity of $3\frac{7}{10}$ knots. 30

The velocity of the east-going stream was observed to be particularly strong between Peak rock and Water island, Lima channel, the result being violent eddies and overfalls, with much discoloured water. 35

In the South channel the streams appeared to be strongest westward of Carter shoal, and about the meridian of Pergam point.

All the shoals and uneven bottom areas are distinctly marked during the strength of the streams by heavy overfalls and eddies. 40

Current.—In making Singapore strait from the northward, vessels should always be prepared to meet with a current running to the southward in the north-east monsoon, and the northward in the

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

- opposite season, the strength of which is governed by the strength of the monsoon. In fine weather its rate is usually from $1\frac{1}{2}$ to 2 knots an hour, but the rapidity of the current is also accelerated or retarded
 5 by the tidal streams near the coast. Between Horsburgh lighthouse and a position 40 miles to the eastward, it has been known to set at the rate of from 3 to 4 knots an hour.

DIRECTIONS.—Singapore road to the eastward.—

- Having cleared the road, course may be shaped about 85° true, and
 10 by keeping the flagstaff on Fort Canning bearing northward of 270° true, as long as it remains in sight (or the *white* light kept in sight at night), will lead southward of Johor shoal. South Lima island just open of South point, bearing 75° true, also leads southward of Johor shoal. When Johor hill bears 0° true, the vessel will be eastward of Johor
 15 shoal, and may steer for Horsburgh lighthouse, bearing about 79° true, until within about 5 miles of it when course should be altered to pass about one mile to the northward of it, thence into the China sea, eastward of North patch, and as convenient.

- In thick weather the land is seldom obscured for any length of time,
 20 so that a vessel is generally able to fix her position; but if not able to do so the soundings will show whether she is within the 20-fathoms contour line, which should be avoided, and course altered as necessary to keep in the deep gutter, passing in preference over the 9-fathoms bank westward of Horsburgh lighthouse, and avoiding the area within
 25 the 20-fathoms contour line off Lima islands. If in any doubt the vessel should haul towards the north shore, by the lead, and anchor.

- To work through the eastern part of Singapore strait.**—Sailing vessels will experience no difficulty in working in either direction through the eastern part of the strait. The best plan
 30 is to keep towards the north shore, in case of having to anchor, as the depths are more convenient on that side. The shore may be approached to depths of 11 or 12 fathoms; South Lima island, as above mentioned, kept open of South point, bearing 75° true, leads southward of Johor shoal, and, when standing towards this danger, if these
 35 objects cannot be seen, preserve the depths mentioned, for the shoal is steep-to.

- When eastward of South point keep Tanjong Sitapa in line with, or open of South point, bearing 274° true, until South Lima island bears westward of 0° true; and, when standing towards Falloden
 40 Hall shoal, South point should not be brought southward of 266° true, and when standing towards Congalton Skar and the shoals northward of it, Tanjong Pungei should be kept bearing westward of 337° true. A vessel may stand towards Rumenia shoals until the

General charts 2757, 3543.

Singapore Strait. Eastern approaches.



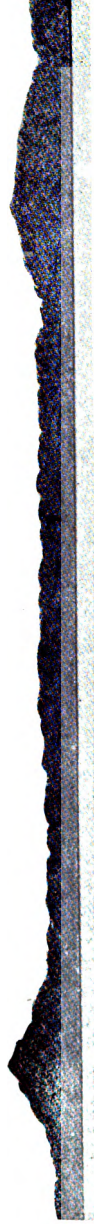
Sumpat.

Bintang North coast. Telok Sumpat. Pulo Sumpat bearing 136° true, distant 3 miles.



(b)

Great and Little Bintang, in line bearing 174° true.

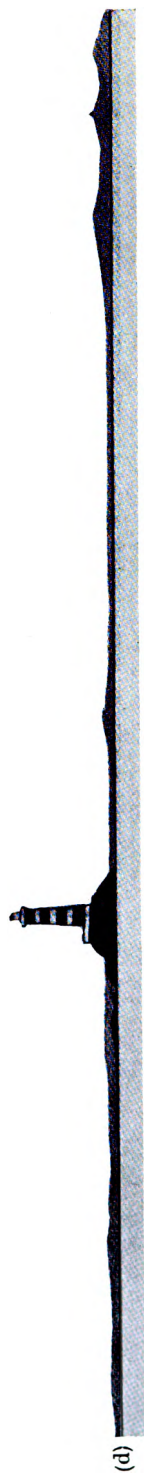


(c)

Barbukit.

Barbukit bearing 234° true, distant 20 miles.

False Barbukit.



(d)

Horsburgh or Pedra Branca lighthouse.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

solitary tree on South point is in line with the south tangent of South Lima island, bearing 256° true.

There are no dangers on the south side of the strait, excepting those fronting the Bintang coast, and the Crocodile and Pan reefs, in the entrance to Rhio strait, Vol. II., &c. But a vessel should not stand so far over as to get near these dangers, for no advantage will be gained by doing so, and the depths there are inconveniently great for anchorage. Pulo Nongsa, lying just to the westward of the entrance to Rhio strait, is very convenient for taking bearings to avoid the dangers in the approach to that strait, and if kept bearing southward of 270° true will lead northward of them all. Vessels are recommended to use Middle channel when eastward of the entrance to Rhio strait.

From the China sea.—Middle channel, the passage generally used by vessels passing through the straits, has an average width of 4 miles between Horsburgh lighthouse and the 10-fathoms contour line off Rumenia shoals. There are no dangers within this area, but a vessel should, when approaching from the eastward, steer so as to pass about $1\frac{1}{2}$ miles northward of the lighthouse, and then alter course so as to proceed through the centre of the channel.

The entrance may be easily recognised, if the weather be clear, by Bintang Great hill, a remarkable Saddle hill on Pulo Bintang, and Barbukit, the sharp-peaked hill on the opposite side of the strait. Bearings of these objects will serve to determine the vessel's position when shaping a course to sight Horsburgh lighthouse.

Departing from Pulo Aor (Vol. III.), steer to bring it to bear about 0° true when disappearing; if the weather be clear, Bintang hill and Pulo Aor may be seen together, but this seldom happens. The western summit of Bintang Great hill in line with the foot of the east slope of Bintang Little hill, bearing 182° true, leads nearly one mile eastward of North patch, of $3\frac{1}{2}$ fathoms. See views abreast.

At night.—In making the entrance at night, if the vessel's position be known, it will be merely necessary to stand on boldly for Horsburgh light, making allowance for the set of the stream; and when the light is seen, steer so as to pass about from one mile to 2 miles northward of it. See Tidal streams, page 295.

In slightly hazy weather, having Pulo Aor disappearing bearing about 0° true, a course between 192° true and 204° true may be requisite if the north-eastern stream is running out of the strait. The depths will decrease regularly in steering southward, and the low land will probably be seen to the westward when in depths of 18 or 20 fathoms; if so cast it along at about 13 miles distance, until

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0^{\circ} \frac{3}{4}$ E.

Bukit Stijam or False Barbukit, a low sloping hill, is discerned, appearing like a clump of trees more elevated than the others. When this hill bears 248° true a depth of 15 fathoms is the fair track; with it bearing 265° true, overfalls in 16 to 13 fathoms may be experienced, or probably less water, the vessel being then on about the parallel of the North patch and Eastern bank.

If in any doubt about the position of the vessel she should either haul off into deep water or anchor.

- 10 The following directions must only be followed at the discretion of the master of the vessel.

With Bukit Stijam or False Barbukit bearing 265° true, if casts of 10, 9, or 8 fathoms be obtained, and being uncertain whether these soundings are near the North patch, or on the shallow part of Eastern bank, haul to the south-eastward until in 14 or 15 fathoms. Then steer 180° true until the hill bears 270° true, when the vessel will be to the southward of Eastern bank, and may haul in 248° true, when a cast of 10 or 11 fathoms will show that these soundings are on the outer edge of Rumenia shoals.

- 20 In doing this the lead must be quickly hove, and if less than 10 fathoms be obtained, haul out directly eastward into depths of 15 or 16 fathoms, and then steer along the south-east edge of the shoals in depths of 16 to 17 fathoms.

Course should be steered to make Horsburgh lighthouse, bearing about 215° true, passing northward of it at the distance of one to 2 miles. Sailing vessels should not approach Horsburgh lighthouse within the distance of one mile, as the tidal stream runs strongly, and there is danger of being drifted on to the rocks in calms or light winds.

- 30 Tanjong Sitapa in line with South point, bearing 274° true, leads southward of all the Rumenia shoals.

From abreast South point, South Lima island kept just open of that point, bearing 75° true, astern, will lead southward of Johor shoal, from whence course may be shaped for Singapore road.

- 35 The vessels in the road will be a guide in approaching the anchorage, and as Tanjong Katong is neared, the flagstaff on Fort Canning hill should be brought to bear about 287° true, which leads in.

With the tidal stream running to the westward it is the usual practice for sailing vessels to keep well over on the north side of the channel, especially in light winds, for, neglecting this precaution, they have often been swept by the rapid current past Singapore road and the St. John islands (the deep water, 45 or 50 fathoms, rendering it difficult or impossible for them to anchor) into the western part of the strait.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

At night it is necessary to keep a good lookout for Horsburgh light, which should be in sight before a vessel can get near the dangers at the entrance of the strait. It is a sufficient guide for navigating Middle channel. 5

The light bearing about 215° true will lead well eastward of the ridge between Rumenia shoals and North patch; when about 2 miles distant from the light a course may be shaped to pass about 2 miles miles northward of it, and bringing it astern bearing about 82° true until the light on Fort Canning at Singapore comes in sight. 10

Both lights will be visible at the same time in clear weather, when about midway between them. Fort Canning should be brought on about the bearing 287° true, which leads in between the shoals off Tanjong Katong and Outer shoal.

In the event of Fort Canning light not being distinctly made out by the time Johor hill bears 12° true, care is necessary not to shoal the water under depths of 16 fathoms towards Johor shoal; and if a cast of 10 fathoms be obtained the course should be altered quickly to the southward, for this shoal is steep-to, and cannot be approached with safety under that depth. 15 20

It is necessary, in a sailing vessel, to observe the precaution of keeping on the north shore of the strait when nearing Singapore road at night, for although a vessel may have entered the strait with a strong north-east monsoon, yet when approaching the road, at night, the wind will generally draw off the land from the north-westward, making it always difficult and sometimes impossible to fetch in or even to get into a convenient depth of water for anchoring. 25

If bound into Malacca strait, from abreast Johor shoal, with Fort Canning light in sight, course may be altered for St. John islands, observing that Raffles light is visible from a distance of about 5 miles eastward of those islands, when clear of them, and leads clear of all dangers northward of it. A vessel should steer to pass within a short distance of St. John islands, avoiding the south side of the strait, thence passing southward of Raffles light at a prudent distance, and shaping course for Malacca strait. 30 35

South channel is not recommended for vessels of heavy draught, as there is no advantage gained by using it, and the bottom is generally rocky and uneven, with numerous shoals. The principal dangers are South ledge and Carter shoal, as before described.

Should a vessel, however, find herself in the South channel, she should not pass between South ledge and Horsburgh lighthouse, nor southward of Carter shoal. Barbukit or Gunong Pelali, open westward of the highest coast hill, and bearing 303° true, will lead 40

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

between Carter shoal and South ledge in not less than 10 fathoms (view on top of chart 2403); and as soon as Horsburgh lighthouse bears 56° true, a vessel may shape course through the fairway of the strait for Singapore road.

North channel (*Lat. $1^{\circ} 25' N.$, Long. $104^{\circ} 20' E.$*), lying between Rumenia shoals and the dangers outlying the Lima islands, is about $3\frac{1}{2}$ miles wide, with banks of from 3 to 5 fathoms in the fairway, and it is possible that other dangers may exist than shown on the chart. As no advantage is gained by passing through, it should not be used by strangers. It is used by coasting craft.

OLD STRAIT OF SINGAPORE OR SALAT TEBRAU.

Chart 2403, Singapore strait.

GENERAL REMARKS.—Old strait of Singapore, the channel between Singapore island and the Malay peninsula, was formerly the passage by which all vessels proceeded between India and China, when the Main strait at present in use was not known to be navigable.

Its western approach (*Lat. $1^{\circ} 18' N.$, Long. $103^{\circ} 37' E.$*) is barred by a sandbank which stretches across from Tanjong Bulus to Tanjong Gul, with depths under 3 fathoms; a narrow channel with a depth of about $3\frac{3}{4}$ fathoms is shown on the chart southward and eastward of Pulo Merambong.

Within the entrance the fairway depths are not less than 4 fathoms, avoiding the charted shoals, and the eastern entrance is much deeper, referred to under Kwala Johor, page 287.

The strait is much used by local trading craft visiting Johor Bahru or New Johor, but strangers should not attempt it without a pilot on a first visit. The dangers will be seen on the chart.

Fresh water is obtainable at several places in Old strait.

Pulo Merambong is an islet 107 feet high, with a ridge nearly dry in places extending 2 miles northward of it, parallel to the channel. At about a quarter of a mile eastward of the islet is the 3-fathoms edge of the bank which extends south-west of Tanjong Kampong, a mangrove point, the east point of the entrance; on this ridge there are many patches, some dry at low water.

Beacons.—A beacon, numbered “28,” marks the small reef at $1\frac{1}{4}$ miles southward of Tanjong Kampong, and another, No. 25, marks the edge of the reef off that point.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Johor Bahru (New Johor) (*Lat. $1^{\circ} 27' N.$, Long. $103^{\circ} 46' E.$*), on the north side and near the middle of Old strait, 14 miles north-eastward of Pulo Merambong in the entrance, is the capital of the territory of Johor, and was founded by the present ruler about 40 years ago. It is a flourishing town of about 20,000 inhabitants, mostly Chinese, the seat of Government and the residence of the Sultan, and presents a most picturesque appearance viewed from Singapore on the opposite side of the strait, built as it is along the shore, with the surrounding hills dotted over with bungalows and well laid out gardens. See the State of Johor, page 14. 5 10

Facing the sea is the Istana Laut, the principal residence of the Sultan; there are good roads to the interior, an esplanade over a mile in length, airy hospitals, waterworks, wharves, and extensive saw mills, for the purpose of cutting up the timber as it is brought from the adjacent forests. 15

A steam ferry crosses the strait to Woodlands, the terminus of the railway from Singapore, with which place there is also telegraphic and telephonic communication.

Anchorage.—The anchorage, about 2 cables off the town pier, is in about 9 fathoms, mud bottom. There is a depth of 5 fathoms within 20 yards of the pier, which is only about 15 feet in length. 20

Tidal streams.—The tidal streams meet off Tanjong Petri, just eastward of the town, and during the stay of H.M.S. *Hyacinth*, from 20th to 22nd February, the vessel swung twice in 24 hours. The velocity of the stream varied from half a knot to $1\frac{1}{2}$ knots an hour. There were, however, two high waters in the 24 hours. 25

Eastern entrance.—Sarangong harbour (*Lat. $1^{\circ} 24' N.$, Long. $103^{\circ} 57' E.$*).—The eastern entrance of Old strait, is between Tanjong Changi and Tanjong Kopo on the Malay peninsula, approached by Kwala Johor, page 287, and is divided into two channels by Pulo Ubin. The coast of Singapore island within Tanjong Changi trends westward for about $1\frac{1}{2}$ miles, when it recedes, forming Sarangong harbour, 3 miles wide, with depths of 8 to 12 fathoms: About one mile westward of Tanjong Changi is a small river with a few bungalows and a police station near it. 30 35

About $1\frac{1}{2}$ cables westward of Fairy point, the eastern side of Sarangong harbour, are Batu Putih, two white rocks 12 feet high, with deep water close to. The entrance to the harbour is between these rocks and the islands and rocks below described. 40

Several streams discharge themselves into Sarangong harbour, the principal of which, the Sarangong, is at its western extreme, and about one mile off the entrance of the river. Pulo Sarangong lies on a mudbank which fronts the coast in the western part of the harbour.

General charts 2757, 3543.

Chart 2403, Singapore strait. Var. $0\frac{3}{4}^{\circ}$ E.

Pulo Ubin, on the north side of Sarangong harbour, is about 4 miles in length, in an east and west direction, and one mile in breadth. A shoal spit extends three-quarters of a mile eastward, and one mile in a south-easterly direction from its east extreme; there are depths of 4 to 8 fathoms close to this shoal.

Pulo Sikodo, encircled by a reef, lies south of the south-east extreme of Pulo Ubin with Papan, a sunken rock, 2 cables southward of it. A 3-fathoms patch lies about 2 cables off-shore, south-eastward of Pinang Rawang, and westward of the south point of Pulo Ubin is Pulo Ketam, with patches of reef extending from both its extremes.

Bentan.—At Bentan, north side of Old strait, nearly 3 miles westward of Pulo Ubin, is a flagstaff, and a wooden pile pier.

Directions.—The channel northward of Pulo Ubin, with a least breadth of 3 cables, is the better of the two. By keeping within half a mile of Pulo Sijahat (a group of three islets) the spit extending off Pulo Ubin will be avoided. When the north extreme of Pulo Tekong Kechil bears 85° true, course may be altered to pass in mid-channel northward of Pulo Ubin; thence keeping to the northern side of the strait, distant about 3 cables, the lead giving sufficient warning if too close. From abreast Pulo Khatib Bongsu, keep in mid-channel until abreast Johor Bahru or New Johor.

The navigable channel southward of Pulo Ubin, through Sarangong harbour, is half a mile wide, with depths of 12 fathoms, but the shoals are steep-to on either side. The eastern Kapala rock in line with Johor hill, bearing 101° true astern, leads through in mid-channel to abreast Pulo Sikodo and the sunken rock south of it. Thence steer, through Sarangong harbour, passing fairly close northward of Batu Putih rocks to avoid the 3-fathoms patch and the mud flat extending off the south point of Pulo Ubin.

When the west extreme of Pulo Ubin is well open of Pulo Ketam, borrow on the north shore to avoid the bank extending eastward of Pulo Sarangong; thence across to Ayer Biru, and keeping to the north side of the strait as when passing northward of Pulo Ubin.

General charts 2757, 3503.

CHAPTER VII.

WEST COAST OF SUMATRA.—UJONG RAJA TO PADANG ROAD AND
EMMA HAVEN IN KONINGINNE BAY.

VARIATION, westerly, increasing about 2 minutes annually.

GENERAL REMARKS.—Aspect.—In outward appearance the west coast of Acheh, the northern portion of Sumatra, differs entirely from the east and north coasts. In the latter portions there is a considerable alluvial plain almost all along the coast, with here and there a chain of hills extending nearly to the sea, and with a regular coast line. 5

On the west coast there is for the most part a high rocky coast, or if there is a strip of strand by the sea, the land rises rapidly behind it to the neighbouring hills; it is only between Ketapan Pasir and Cape Felix (*Lat. 4° 38' N., Long. 95° 39' E.*), 77 miles south-eastward of it, also southward of the mouth of the Kluat, which is 53 miles south-eastward of Cape Felix, that there is a plain of any breadth on the coast. 10

Numerous small streams discharge their waters on the west coast, but most of them are barred, and only navigable by canoes. An almost unbroken chain of mountains extends southward from Acheh head parallel to the coastline, at a distance of from 6 to 8 miles, known as the Barisan or Gunong Itam range; the principal peaks will be mentioned with the portion of the coast adjacent to them. 15

CAUTION.—The coastline is deeply indented, forming numerous bays, none of which, however, northward of Tapanuli, afford complete shelter during the south-west monsoon. There are many visible and sunken dangers off the coast, but northward of Cape Felix, they do not extend to any great distance: southward of that point they extend from 20 to 30 miles off, and, from the incomplete surveys, many dangers no doubt exist that are not charted, so that considerable caution is necessary at all times. Numbers of them are coral reefs, steep-to, of which the lead will give no notice, requiring a good look-out aloft to be kept during daylight, and to proceed only at moderate speed when in the vicinity of dangers. The use of the lead, however, should not be neglected. 20 25 30

Natives.—Northward of Cape Felix (*Lat. 3° 45' N.*) Acheh (Atjeh) people and Pedirese predominate, and to the southward Malays. The chief Acheh characteristics are their independence, cruelty, and un-

General chart 2760.

trustworthiness. The latter makes any transactions with them difficult, and the Chinese are actually sometimes their victims. Nearly all the states on the west coast of Achéh, which were formerly subject to the Sultan of Achéh (Atjeh), have entered into a treaty with the Dutch government. The authority of the native chief does not, as a rule, extend beyond the mouth of a river traversing a state and the coast bordered by it; there are separate chiefs for the interior.

Merchant vessels visiting places on this coast should be on their guard against being surprised by the natives, and never allow armed parties to come on board, nor unarmed ones in any number.

ROUTES.—General remarks.—The routes along the west coast of Sumatra may be considered as three in number, but the Outer route only, in the open sea, may be said to be free from danger, as the coast is only partially surveyed. Vessels should keep the sea until abreast the desired port before hauling in.

For a sailing vessel, the voyage in either direction and at all seasons is long and wearisome on account of frequent calms, but it is generally more difficult to work northward than southward, owing to the prevalence of south-easterly currents, which may be looked for even with and after a southerly wind.

January and February are the best months for going northward, while in September, October, and November vessels will often be compelled to keep far out to sea in order to make even a little northing; working in-shore during these months is almost impracticable. Winds and weather, *see* pages 23-28.

Outer route.—The route to the westward of all the islands, in the open sea, is the best of the three, more especially for sailing vessels and others not intending to touch at any of the west coast ports. South-west and southerly winds often prevail here, when north-west squalls, variable baffling winds, calms, and southerly currents, may be experienced close to the land. A quicker voyage to the northward will thus be made during either monsoon. If touching at any of the ports, they may be steered for when on their parallel.

Middle route.—The Middle route is the space between the chain of large islands, in the offing, and those small islands adjacent to, and interspersed along, the coast, and ranges from 10 to 30 miles distance from the coast of Sumatra. It is frequently taken by the Netherlands vessels of war, and the coastal mail steamers running between Batavia and Achéh, *viâ* the coast ports.

It should not be followed by a sailing vessel when bound to the northward, not at any time, if it can be avoided without inconvenience, for although it is wide, and may be adopted by night or day, in vessels of light draught, when the weather is clear and favourable, vessels are

General charts 2760, 2761.

more at the mercy of the currents when the winds are light and baffling, and there is no anchorage; in some parts there are dangerous coral shoals, of the approach to which the lead will give no warning.

Inner route.—The inner route is that close along the coast, and between some of the islands and dangers off it. It, like the Middle route, should seldom be chosen by sailing vessels bound to the northward in either monsoon; but as there are in many places moderate depths for anchoring, it is preferable in that respect to the Middle route. Vessels visiting many of the ports are obliged to use it, but considerable risk is run when taking this route at night; those using it are generally obliged to anchor at sunset.

Pilots.—Men possessing some local knowledge are obtainable at Padang, and possibly at other places on the coast, but too much dependence must not be placed on them. *See also page 33.*

Tides.—There is but little tide on this coast, the rise being very small, the flood setting northward and the ebb southward. The tidal influence does not extend above 4 miles from the coast. The current is more often south-easterly than north-westerly in the offing; but during the south-west monsoon, it sometimes sets northward for many consecutive days. (*See Currents, Tides, pages 29, 30.*)

Double daily springs occur at Ujong Raja, or King point, at about half-a-day before full and new moon, with high water at 6h. and a rise of half-a-foot. Single daily springs occur one day after the moon's greatest declination, with a rise of about half-a-foot.

Chart 219, Acheh head to Diamond point.

ACHEH HEAD to RIGAS BAY.—Aspect.—The coast between these two points, about 57 miles apart, is very irregular, and has many prominent headlands, with bays between, none of which afford secure anchorage during the south-west monsoon. The coast is steep and rocky from Acheh head to the north side of Krung Raba bay, beyond which sandy bays occur.

In most places the land rises sharply to the hills within; the principal exceptions are the low land in Krung Raba bay (*Lat. 5° 29' N., Long. 95° 16' E.*), which continues through the cleft into the Acheh valley, also the valley of the Krung Lambesoi, 25 miles to the southward, and between Gle Eh Manuk point and Jinamprong, which forms a conspicuous break in the Barisan range.

Population.—The coast is thinly populated, owing to the frequent wars and the prevalence of fever, consequently only a few villages exist; the pepper cultivators live further inland.

General directions.—Numbers of sunken dangers lie near the coast, rendering it advisable to give it a berth of 5 or 6 miles, especially

General chart 2760.

Chart 219, Acheh head to Diamond point. Var. nil.

at night. Most of the dangers are steep-to, as is the coast in most places, but they are generally seen by the surf breaking over them. There are numerous prominent headlands and mountains by means of which the position of a vessel is easily ascertained. Near the shore, the bottom is sand, or sand and coral; near Pulo Raja it is sand and mud, or mud, in depths of 8 fathoms and beyond.

The indifferent bottom almost everywhere, and the heavy ocean swell, and poor shelter from westerly winds, renders most places on this portion of the west coast undesirable anchorages, and sailing vessels particularly must be ready to leave them at any moment.

Landmarks.—Mountains.—The following mountain tops may be recognised and are useful marks when navigating along this coast. *See views, abreast.*

Glé Raja, the summit within Acheh head, has been referred to on page 57. It is the summit of the Paran range which forms Ujong Masam Muka.

Glé Karang (*Lat. 5° 16' N., Long. 95° 15' E.*), 686 feet high, is easily recognised; it is situated on the tongue of land forming the north side of Riau bay.

Green hill, a conspicuous green hill, 1,037 feet high, with a bare round top, is situated on the tongue of land separating Riau and Lehong bays.

Batu Mukurah (*Lat. 5° 14' N., Long. 95° 31' E.*), 7,152 feet high, is a sharp peak 15 miles within Green hill. Gunong Puchak Pudeng, 6,480 feet high, is the highest and southernmost point of the ridge whose spurs extend to the sea at Riau and Sidoh bays. The mountain is precipitous on the south side, and is usually to be distinguished at night if close in; it is not charted.

Timbaga hill (Glé Teumiga), a truncated cone 856 feet high, is one of the best landmarks on the west coast; it lies on the north side of Daya bay and descends steeply to the sea. There are many caves in the hill containing edible birds' nests. Southward of Timbaga hill is a low range of hills, named Bukit Sjurga, which when seen from the southward appears as a sharp-peaked hill.

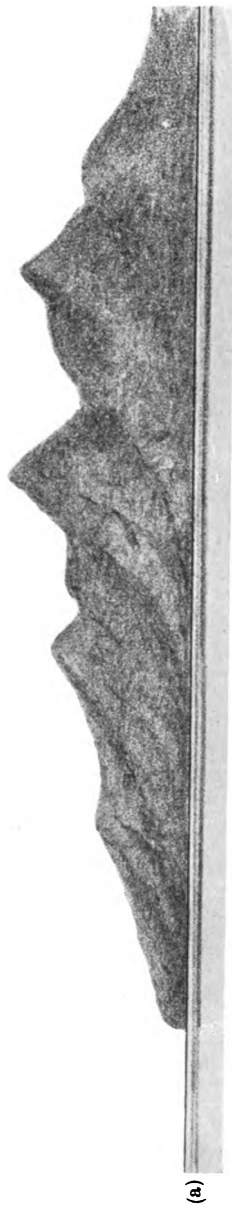
Raja hills (*Lat. 4° 55' N., Long. 95° 26' E.*) are two hills close together; the westernmost and higher of the two is 1,840 feet in height. Medang, 679 feet high, is the summit of a promontory in Raja bay.

Chart 2760, Acheh head to Chingkek bay.

Gunong Kwali, 1,289 feet high, just northward of Rigas bay, is a good landmark, and visible in clear weather from a distance of 40 miles. From the south-eastward it appears as a cone, with a few peaks westward of it; from the north-westward two summits will be

General chart 2760.

Views of the coast hills southward of Ujong Raja.



(a)

Ujong Raja.

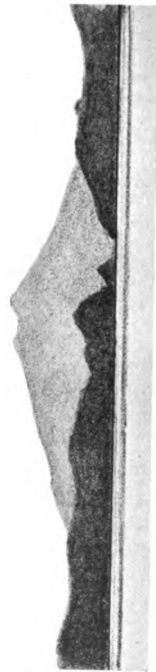
Ujong Raja or King point bearing 45° true.



(b)

Green hill or Kruet bearing 112° true ; between
Riau and Lehong bays.

Kwadi.



(d)

Gunong Kwali bearing 130° true.

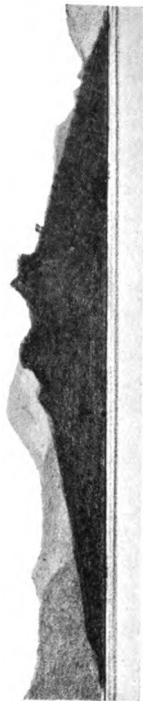


(c)

Timbaga hill.

Timbaga hill bearing 342° true, distant 14 miles.

Kwadi.



(d¹)

Gunong Kwali bearing 90° true, distant 8 miles.



(e)

Chart 2760, Acheh head to Chingkok bay. Var. nil.

seen, the northernmost being the lower. Its south-east side is cleared, and looks like cultivated land.

Sikawit, 2,280 feet high, about 8 miles within Rigas, appears as two peaks, rising high above the intervening hills, when abreast it. 5

Singa Mata, about 35 miles from the coast, is 6,129 feet high, and the summit of an inland range (*Aspect continued on page 325*).

Chart 219, Acheh head to Diamond point.

COAST.—King point, or Ujong Raja, about $3\frac{1}{2}$ miles southward of Acheh head (page 58), is a lofty promontory rising precipitously from the sea, and easily recognised from all directions; there are depths of 12 fathoms at a short distance from it. Sailing vessels bound through Surat passage or Aroih Chut under Acheh head, will find temporary anchorage here, should the wind and current be unfavourable. There are two coves between King point or Ujong Raja, and Acheh head, which afford good anchorage for small craft. 10 15

KRUNG RABA BAY (*Lat. $5^{\circ} 29' N.$, Long. $95^{\circ} 16' E.$*), the north extreme of which lies $2\frac{1}{2}$ miles southward of Ujong Raja, is about 4 miles wide; the mountains on either side make it appear as a valley when a considerable distance off, and it has been mistaken for Surat passage (Aroih Chut). 20

Krung Raba, an insignificant stream, discharges into the bay by three mouths, the southernmost of which is at rare times available for boats, but there is always a considerable surf.

Plan of Krung Raba northern anchorage on 2284.

A coral reef, nearly dry in places, half a mile wide, and $1\frac{1}{2}$ miles in length, fronts these mouths and the coast northward to point A. on plan; a sunken reef, with a least depth of $3\frac{1}{4}$ fathoms, extends 7 cables north-west of it and nearly across the cove forming the northern part of the bay. 25 30

Anchorage.—There is good anchorage in the cove in the northern part of the bay, within the sunken reef, in a depth of about 7 fathoms; a conspicuous tree at the head of the cove, bearing 98° true, leads in northward of the reef. The southern part of the bay affords anchorage during the north-east monsoon, in about 12 fathoms water, over sand and coral, but it is completely open to westerly winds. Some rocks above water lie about 2 cables off the southern shore with Ujong Ritieng bearing 207° true, distant $1\frac{1}{2}$ miles. 35

Chart 219, Acheh head to Diamond point.

Ujong Ritieng is a precipitous headland with a rock above water close off it and depths of 12 fathoms just beyond. The village of the same name is situated on the creek southward of it. 40

General charts 219, 2760.

Chart 219, Acheh head to Diamond point. Var. nil.

Ritieng bay lies between Ujong Ritieng and Ujong Pulut (Pulut), $4\frac{1}{2}$ miles apart.

Barba and Lepong are the shallow extremes of the passage within the island close to the shore of Ritieng bay.

Telok Pulut is a small inlet between Pulut and Lepong, where there is anchorage in 4 to 6 fathoms for small craft during off-shore winds.

Sketch plan of Sidoh or Sedu bay on 2284.

SEDU (SIDOH) BAY (Lat. $5^{\circ} 21' N.$, Long. $95^{\circ} 16' E.$), 5 miles southward of Ujong Ritieng, is about half a mile in extent, and entered eastward of Ujong Sedu: a coral reef, with a rock above water on it, extends nearly 3 cables off the western side of the bay, and the eastern side is foul for a distance of a cable.

Ujong Pulut, on the north-eastern side of the approach, has a depth of 7 fathoms fairly close to; Pulut hill, 463 feet high, lies immediately over it.

Anchorage.—There is good anchorage in the entrance, in a depth of about 7 fathoms, over mud, with Ujong Sedu bearing 277° true, and Tanjong Pulut 56° true; large vessels should anchor farther northward in 8 to 9 fathoms, but vessels must be prepared to leave this at any moment; the bay also affords fairly good anchorage for small craft farther in, in a depth of 3 fathoms, over a breadth of about one cable.

Chart 219, Acheh head to Diamond point.

Batu Mandi is a group consisting of three rocks above water, situated about one mile 230° true from Ujong Sedu; there is a depth of 10 fathoms in the passage, about 3 cables in breadth, between these rocks and some rocks above water extending off the shore nearly abreast.

Amboina bay, or Lho Paroë, about one mile in extent, affords anchorage in depths of from 5 to 6 fathoms, but is open to the westward, and inconvenience is caused at times by swell during the easterly monsoon. A short reef extends off the point on the south side of it.

Perling rocks, above water, extend about one mile off-shore at the same distance southward of Amboina bay, with depths of from 7 to 10 fathoms inshore of them. Two of the rocks are wooded, and the largest rock is known as Batu Buja. There is said to be depths of 7 to 10 fathoms between them and the shore.

OUTLYING REEFS.—**Aart van Nes**, a coral patch with a least depth of 6 fathoms, and about 10 fathoms around, lies in the offing abreast Krung Raba bay, with Ujong Ritieng bearing 101° true, distant nearly 5 miles.

Cuhurn (Coehoorn) reef, $6\frac{1}{2}$ miles southward of Aart van Nes, has a least depth of 7 fathoms, and from 10 to 20 fathoms around, with Ujong Sedu bearing 76° true, distant $3\frac{3}{4}$ miles.

General charts 219, 2760.

Chart 219, Acheh head to Diamond point. Var. nil.

Sindora reef, a coral patch about one mile in length, north and south, by half a mile in breadth, with depths of 5 to 7 fathoms, is steep-to, there being 30 fathoms close-to on its western side, and 11 to 15 fathoms on the north and east sides. From the shallowest spot near its south extreme, Pulo Rusa bears 127° true, distant $4\frac{1}{4}$ miles. 5

Plan of Riau and Lehong bays on 2284.

COAST.—Pulo Rusa (*Lat. $5^{\circ} 15'$ N., Long. $95^{\circ} 14'$ E.*), 279 feet high, is about one-third of a mile in extent, and situated about the same distance off the north-west point of Riau bay; there are two shallow patches in the channel between, one which always breaks, with one fathom water, and another between it and Tanjong Buga. The island is thickly wooded, has a jagged coastline, and there is sandy beach on the south-west side, where near a group of cocoanut trees landing may be effected at times. A few families live on the island. See view *a* on page 310. 10 15

Anchorage.—There is anchorage in the channel within the island, avoiding the rocks mentioned; the Rusa side should be kept where there is a depth of not less than 6 fathoms. Batu Mandi, rocks above water, just open of Ujong Data (2 miles northward of Rusa) leads through. Tanjong Buga, abreast, on the main island, is the extreme of a precipitous black and rocky promontory, 685 feet high, forming the north-west side of Riau bay. 20

Reef.—A reef, which breaks, reported by the master of the Netherlands Government steamer *Zeeduif*, is charted $1\frac{8}{10}$ miles to the westward of Rusa island. (*Chart 219.*) 25

RIAUBAY, or Lho Blang Raja, about one mile in extent, affords exposed anchorage in depths of from 7 to 8 fathoms, over sand; there are villages on the shores of the bay. There is usually considerable surf in the northern part of the bay, where the Kulu and Kala streams discharge, and the best landing is then in the south-east corner. 30

Ujong Buga, the north point of the bay, is fairly high, with steep rocky sides; the hill within it is 951 feet high.

Ujong Tiba (*Lat. $5^{\circ} 14'$ N., Long. $95^{\circ} 16'$ E.*), the south extreme of the bay, is a rocky promontory and a spur of Green or Kruet hill, 984 feet high, and separates Riau bay from Lehong bay. See view *b* of Green hill on page 306. 35

A coral bank, with a depth of 9 fathoms, and 16 fathoms around, is situated in the offing, with Pulo Rusa bearing 59° true, distant $5\frac{3}{4}$ miles, and Timbaga hill in line with Pulo Kluang bearing 119° true. 40

Lehong (Loöng) bay is $1\frac{1}{2}$ miles in breadth between Ujong Tiba and Ujong Puderut, with depths of from 5 to 8 fathoms. The northern portion is known as Lho Tiba and the southern as Lho Po Tulot, by the natives. 45

General charts 219, 2760.

Plan of Riau and Lehong bays on 2284. Var. nil.

Rock.—A sunken rock, which seldom breaks, is situated 352° true, distant 2 cables from Ujong Puderut, the plan shows no soundings outside it. Between the rock and the point there are depths of from
5 7 to 8 fathoms, and there are no other dangers in the bay more than 50 yards off-shore.

Anchorage.—The bay is exposed to westerly winds, but affords anchorage during fine weather, in a depth of 5 fathoms, with Ujong Puderut, the rocky headland forming its south point, bearing 226°
10 true, and eastward of the rock above-mentioned. Vessels here will be near Puderut village, at a distance of 3 cables off-shore.

Chart 219, Acheh head to Diamond point.

Ujong Puding, 2½ miles southward of Ujong Puderut, is a low headland with a reef extending about half a mile off it; Pulo Rusa,
15 open of Ujong Puderut, leads seaward of it in a depth of 8 fathoms. Ujong Sidagung, to the southward of Ujong Puding, is a steep and rocky point with depths of 7 fathoms close-to.

Plan of Kluang bay on 219.

KLUANG BAY (*Lat. 5° 7' N., Long. 95° 19' E.*) affords
20 anchorage for small craft, in a depth of about 7 fathoms, eastward of Pulo Kluang; it is open to the north-west, and there is considerable swell here during the south-west monsoon, rendering it, with strong winds, an undesirable anchorage. The bay is sandy on its south and east shores, and Kluang village lies on the banks of the Lamtui creek
25 at its head. See view *b*, abreast.

Water.—Drinking water of indifferent quality is obtainable.

Pulo Kluang, a rocky islet about 300 yards in length, 397 feet high, with tall trees, is inhabited by a few families, and there are some houses and cocoanut trees on its eastern side. A remarkable cave runs
30 the whole length of the island, providing a quantity of guano and edible birds' nests.

There is a passage 2½ cables wide between the island and the south point of the bay, with depths of 6 to 8 fathoms; the island side should be kept by small craft using it.

35 *Chart 219, Acheh head to Diamond point.*

Ujong Daweh, a narrow and precipitous tongue of land terminating in two headlands, separates Kluang and Daya bays; there is deep water off the headlands, but the coast between them is fronted by a reef.

40 **Batu Burung** consists of several rocks above water on a reef half a mile in diameter and nearly dry at low water, which lies 2 cables off Ujong Rinjong Kamang, the southern headland of Ujong Daweh;

General chart 2760.

Views of the coast hills from between Pulo Rusa and Timbaga hill.



(a)

Pulo Rusa bearing 127° true, distant 4 miles.

Timbaga.

(b)

Off Kluang Bay ; Timbaga hill bearing 93° true, distant 10 miles.



Raja.

Limpang.

(c)

Saddle of Raja mountains in line with Limpang bearing 141° true, leads between Lambesoi reef and that fronting the coast.



Pulo Raja,
east extreme.

(d)

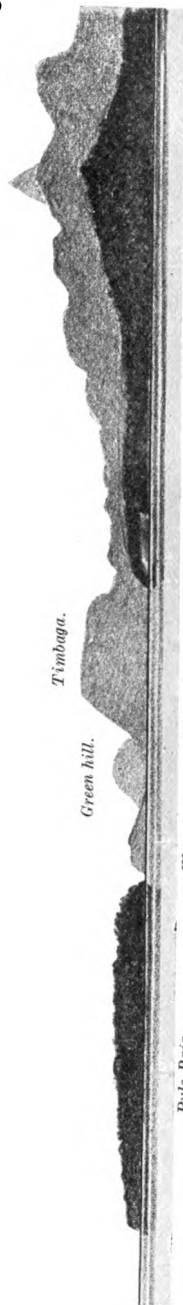
Tanjong
Jinamprong.

Ujong Bangka.

Pulo Raja.

Manch.

The East extreme of Pulo Raja in line with Ujong Bangka bearing 162° true, leads eastward of Subang reef.



Timbaga.

Green hill.

(e)

Pulo Raja.

Kluang.

Raja strait.

Tanjong Bangka.

Tanjong Noh.

Leading mark for Raja strait. East shoulder of the saddle close eastward of Timbaga hill in line with Tanjong Noh bearing 336° true.

Chart 219, Aceh head to Diamond point. Var. nil.

there are depths of from 14 to 16 fathoms between it and the shore, and, if using this passage, the eastern side should be kept.

Daya (Daja) bay, between the south side of Ujong Daweh and Ujong Po, is about 2 miles in extent and open to westerly winds. Timbaga hill, 856 feet high, descends precipitously to the sea on the north side of the bay. Daya village is on the east side of the bay; southward of it was formerly a mouth of the Lambesoi, now closed by a sandbank several feet high.

Ujong Po is lower than Ujong Daweh, but may be recognised by a small, round, green hill at its extreme, which appears as an island from the offing. There are some rocks above water close off it, on which the sea constantly breaks.

Anchorage.—The best anchorage is in a depth of 6 fathoms, sandy bottom, with Ujong Po bearing 177° true, and Kwala Daya 132° true.

Coast.—Gli Eh Manuk, the southern extreme of Ujong Po, is rocky; and thence to Lambesoi bay the coast is fronted by a coral reef to the maximum distance of half a mile.

Plan of Lambesoi bay on 2284.

LAMBESOI BAY (Lam Beusoë) (*Lat. $5^{\circ} 0' N.$, Long. $95^{\circ} 22' E.$*), between Krung Lambesoi and Ujong Karang (Karueng), is about $2\frac{1}{2}$ miles broad and one mile in length to its head.

The Lambesoi, Lubuk, and Unga rivers discharge into the bay, and have villages at their mouths; the first mentioned only is of any importance, and it is the largest on this portion of the coast. It rises in Batu Mukurah, and is navigable for craft of 4 feet draught for about 4 miles. A stony ridge, dry at low water, extends off the western point, rendering it necessary, when about to enter, to approach the entrance from the eastward and hug the east point. There is convenient landing northward of the village.

Pulo Limpang, a rocky islet with precipitous sides of red rock, and crowned by thick foliage, is easily recognised; it is situated on the reef which surrounds Ujong Karang to the distance of about 4 cables.

Dangers.—Lambesoi reef, off the north side of the bay, is, within the depths of 5 fathoms, $1\frac{8}{10}$ miles in length in a north and south direction, with a greatest breadth of half a mile. The least depth, 2 fathoms, near its northern end, always breaks, and it has from $2\frac{1}{2}$ and 3 fathoms in places, but it does not protect the anchorage from a heavy swell. The south extreme lies 288° true, distant $1\frac{8}{10}$ miles from Pulo Limpang. Gle Kareueng hill in line with Ujong Daweh, bearing 341° true, leads westward of the reef.

General charts 219, 2760.

Plan of Lambesoi bay on 2284. Var. nil.

Palintak reef, with a least depth of $2\frac{1}{4}$ fathoms, is about 4 cables square, and lies off Lubuk river, about a mile southward of the Krung Lambesoi; it is marked by breakers.

- 5 About 4 cables southward of the mouth of Krung Lambesoi there is a sunken rock, and with a patch of $3\frac{1}{4}$ fathoms lying 2 cables north-west of it.

Anchorage.—The bay offers but indifferent anchorage, the bottom being sand or rock, and the depths irregular; the Lambesoi
10 reefs, nearly 3 miles off its head, do not break the sea, and the streams from the rivers cause a vessel to lie broadside on, and therefore to roll heavily. The best position is in 7 fathoms, between the north end of Palintak reef and Lambesoi reefs.

Directions.—When entering, Pulo Limpang should be steered
15 for, bearing 88° true, until about one mile from it, or the mouth of the Lambesoi bears about 5° true, when the latter should be steered for, anchoring abreast or a little north-westward of Palintak reef, which, with the northern part of Lambesoi reef, always breaks.

There is a passage from the northward within Lambesoi reefs, with
20 a depth of not less than 6 fathoms, on the line of Pulo Limpang in line with the saddle between the Raja peaks, available by local craft. See view c on page 310.

Gunong Karung, the hill close eastward of Pulo Rusa, open of Ujong Daweh, leads westward of Lambesoi reefs.

- 25 *Chart 219, Acheh head to Diamond point.*

Coast.—**Baba Awi bay** lies between Ujong Subang and Ujong Bangka, which are 3 miles apart. The shore is skirted by a reef all round, and there are three reefs in the bay.

- Subang reef (*Lat. $4^\circ 58' N.$, Long. $95^\circ 22' E.$*), half a mile in extent,
30 with a least depth of 2 fathoms, lies about one mile south-west of the low point of the same name, with Pulo Limpang bearing 9° true, distant $1\frac{3}{4}$ miles. Gunong Karung, open of Ujong Daweh, bearing about 341° true, leads westward of it, as well as of Lambesoi reefs, and the east extreme of Pulo Raja in line with Ujong Bangka, bearing
35 163° true, leads in 7 fathoms water, between the reef and that fronting the shore.

A detached reef lies with its western extreme nearly one mile off Jinamprong, the middle point of the bay, with a passage between it and the reef fronting that point.

- 40 Ujong Bangka, the south-west extreme of the bay, is low, with a coral reef extending about one cable off it, and also from the shore eastward and southward of it.

Vessels from the northward should not approach Ujong Bangka nearer than 3 miles, so as to steer for Raja passage after the point

General chart 2760.

Chart 219, Aceh head to Diamond point. Var. nil.

bears 90° true, when the roadstead can be reached by following the directions given on page 314.

Anchorage.—Baba Awi bay is open to westerly winds, but affords some protection for small craft from south-west winds off Baba Awi village, in a depth of 5 fathoms, mud bottom. 5

Baba Paroi reef is one mile in length, east and west, by half a mile in breadth, with a least depth of $2\frac{3}{4}$ fathoms, from which Ujong Bangka bears 99° true, distant about one mile; it breaks with the least swell. There are depths of 11 fathoms between it and the point; Ujong Baba Nipa in line with the east extreme of Pulo Raja bearing about 158° true leads in the fairway; or Pulo Limpang bearing 355° true, astern. To pass westward of the reef, keep Green hill open of Ujong Daweh, bearing 346° true. 10

Ujong Noh is low, and situated about 2 miles southward of Ujong Bangka. On the coast reef, which extends half a mile from the shore, there are some rocks above water; between the points, at half a mile off-shore, are two others above water, on which the sea usually breaks. Noh village lies eastward of the point. 15

Plan of Raja passage on chart 2760. 20

RAJA BAY or TELOK KRUT.—This bay, about $2\frac{1}{2}$ miles in extent, lies between Tanjong Noh and Pulo Raja, and is one of the safest on this coast, with good holding ground in its southern part in depths of from 8 to 10 fathoms, but open to the north-westward. With these winds sailing vessels can run through Raja strait and anchor under the lee of Pulo Raja. The bay is fronted by a coral reef to a short distance which extends farthest off under Gunong Medang, with rocks above water on it in places. The Charakman creek discharges southward of the hill. 25

There are two villages in the bay, Lho Krut, on the south-east side, being one of the most important pepper ports on the west coast of Sumatra. 30

Pulo Raja is $1\frac{1}{2}$ miles in length in an east and west direction, by half a mile in breadth, and thickly wooded, with its summit 328 feet high. 35

A reef surrounds the island to the distance of half a mile on its west side, and there are rocks above water on that side and on the south side; these are steep-to. Pulo Maneh, 42 feet high, a yellow sandstone rock with a wooded summit and some cocoanut palms, is situated on the reef at the north-west extreme of the island. 40

Raja strait is about 5 cables in length and 4 cables in breadth, but midway between Tanjong Krut and the north-east extreme of Pulo Raja is the northern extreme of ledges of rock, $1\frac{1}{2}$ cables in

General charts 219, 2760.

Plan of Raja passage on chart 2760. Var. nil.

length, dividing the strait into two channels, the western one being the deeper, with depths of about 5 to 8 fathoms over a breadth of about $1\frac{1}{2}$ cables. The westernmost rock has a depth of one foot, the southernmost has 3 feet abreast the iron pier, and the others depths of 12 to 14 feet. Reef extends northward of the north-east extreme of the island for a distance of one cable off Lok Sirun. There are no other dangers beyond the shore reef on either side, which extends but a short distance.

10 **Buoy.**—The northern rock in the fairway is marked on its west side by a conical white buoy; not to be depended on.

Directions.—To proceed through the strait keep about a cable from the island shore, midway between it and the buoy, with depths of not less than 5 fathoms. The channel eastward of the rocks, according to the plan, has apparently not less than 3 fathoms, but there is no occasion for taking it. See views *d* and *e* on page 310.

Tides.—The rise and fall of tide is very slight.

The Dutch station (*Lat. $4^{\circ} 51' N.$, Long. $95^{\circ} 24' E.$*) and fort are situated on the east side of Pulo Raja, in Raja strait, southward of Batu Keramat, the north-west extreme of the island. The graves of the Lho (Batu) Krut chiefs are at Batu Keramat.

Communication.—There is communication every fortnight by the Netherlands Royal Packet Company's steamers between Batavia, Padang, Penang, and Singapore, calling at a number of intermediate ports. See Chapter I., pages 18, 19.

Supplies of fresh provisions and water, in small quantities, may be obtained.

Pier.—Light.—An iron jetty, 60 yards in length, extends from the Dutch station, affording good landing for boats. A light is shown from the end of the pier.

Anchorage.—Anchorage may be obtained off the pier in depths of 7 to 9 fathoms, and there is good holding ground farther northward in a depth of 9 fathoms, off Lok Sirun village, with the east point of Pulo Raja bearing 167° true, and Pulo Maneh 245° true. With north-west winds the best anchorage is about half a mile southward of the Dutch station, in a depth of about 8 fathoms, under the lee of the island. There is also good anchorage, in 10 fathoms water, between Pulo Raja and Ujong Baba Nipa to the southward.

Chart 219, Achek head to Diamond point.

40 **COAST. — Ujong Baba Nipa** (*Lat. $4^{\circ} 49' N.$, Long. $95^{\circ} 26' E.$*), 3 miles south-eastward of Pulo Raja, may be recognised by its yellow, grey, precipitous sides and the rock above water

General charts 219, 2760.

Chart 219, Acheh head to Diamond point. Var. nil.

close off it. The bottom is foul and irregular off the point, and southward of it for about 2 cables, causing heavy rollers during strong winds. Timbaga hill in line with the east side of Pulo Raja leads seaward of all dangers. *See view c on page 306.*

5

Ujong Merak, to the southward of Baba Nipa, is low, and clear of danger, but there are rocks above water off the coast between; eastward of the point a reef extends about 2 cables off-shore.

Water.—About a mile to the eastward of Ujong Baba Nipa is the river and village of the same name; good drinking water may be procured.

10

Ujong Pati (Pate), 2 miles southward of Ujong Merak, has a long green hill with cocoanut trees on it. A reef extends about half a mile off it, and off the bight northward, on which is Pulo Kas, covered with thick foliage, with rocks above water north-west of it. Pati village lies within the point.

15

Chart 2760, Acheh head to Chingkok bay.

PULO KAS (Kuëh) is a high, rocky, thickly wooded, and desert islet, one mile in length, in a north-west and south-east direction, and 4 cables in breadth, situated half a mile south-westward of Ujong Pati. Its west side is steep-to, but the east and south sides have a coral reef half a cable wide, with 6 fathoms close-to. *See view a on page 326.*

20

Anchorage.—The anchorage eastward of Pulo Kas, known as Pati roadstead, is considered one of the best on this coast during the south-west monsoon. A good position is in a depth of 7 fathoms, with the south point of the island bearing 198° true, distant about half a mile, and the summit of Pulo Raja in line with the west slope of the wooded part of Ujong Baba Nipa.

25

COAST. — **Ujong Gunong Malin** (*Lat. $4^{\circ} 44' N.$, Long. $95^{\circ} 30' E.$*) is the hilly coast point 4 miles south-eastward of Pulo Kas; a reef, steep-to, extends half a mile off, with rocks above water on it.

30

Pulo Pejaba are two rocky uninhabited islets, with a few trees, and encircled by a reef. About $2\frac{1}{2}$ cables south-west of the western islet is a rock 17 feet high, steep-to on the west side, and between this rock and the island are three rocks above water. About 3 cables, 166° true, from the Pejaba islets is a sunken rock nearly awash, with depths of 11 fathoms around; there are two sunken rocks between this rock and the islets.

35

40

Pulo Kloëng, or Plieng, lies eastward of Pulo Pejaba, and 2 cables off the coast, abreast Lagen (Laguen). It is higher than Pulo Pejaba, being 394 feet in height, and is thickly wooded, but uninhabited. There are depths of 10 fathoms between Pulo Kloëng

General chart 2760.

Chart 2760, Acheh head to Chinguk bay. Var. nil.

and the Pejaba islets, and about 3 fathoms between Pulo Kloëng and the coast.

Telok Klumpang (Glumpang) lies within the point of the same name, which is a narrow precipitous tongue of land crowned by a green hill with a few scattered trees on it. A reef extends eastward from the point for $1\frac{1}{2}$ cables, and to a distance of three-quarters of a cable off-shore. A rock above water, overgrown with vegetation, lies half a cable south-west of the point. The village is an important place for the pepper trade.

Anchorage.—There is temporary anchorage in a depth of $6\frac{1}{2}$ fathoms off the village with the point bearing 256° true, and the east extreme of Pulo Kloëng bearing 339° true; but the bay being open to winds between S.W. and N.W., vessels must be prepared to leave it at any moment. Good anchorage may be obtained between Pulo Kloëng and Klumpang, in 9 fathoms, over sand and mud, with some slight protection from north-west winds. Sailing vessels should moor with open hawse to the north-west; there is not much room to drag.

Pulo Chikem, or Perling, are two islets situated one mile southward of Ujong Klumpang. The larger and eastern is high and steep, with a coral reef with rocks above water in places, extending 2 cables northward and southward of it. The western islet is steep to on its seaward side.

Batu Broh, three bare rocks about 10 feet high, lie between Pulo Chikem and the Sumatra coast, with a reef on their eastern side. There is a depth of $3\frac{3}{4}$ fathoms between them and Pulo Chikem.

Plan of Rigas and Chalang bays on 1701.

Pulo Ranoi (Ranene), lying a few yards off the point of same name, is a mass of rock, 56 feet high, with a wooded summit, and presents a great contrast to the coast, which is low, sandy, and wooded from Klumpang point to abreast it. A reef fronts the shore between Ranoi and Rigas points to the distance of 3 cables, with rocks above water in places. An islet is charted at about 2 cables off the reef. (Not mentioned in the Dutch Sailing Directions.)

Karang Angkatan, or Gillis reef, with a least depth of about 2 fathoms, and 10 fathoms around, is about 50 yards in extent, and seldom breaks; from it Tanjong Rigas bears 121° true, distant $1\frac{1}{2}$ miles.

Ujong Baba Nipa open westward of Pulo Kas (Keuch), bearing about 332° true, leads westward of it. Raja hills in line with Klumpang point leads eastward of it (view *a* on page 319), and Gunong Kuali in line with Pulo Ranoi leads southward of it.

General chart 2760.

Plan of Rigas and Chalang bays on 1701. Var. nil.

Ujong Rigas (*Lat. 4° 39' N., Long. 95° 32' E.*), the south-west extreme of the peninsula within which is Rigas bay, is a rocky headland rising steeply from the sea, covered with vegetation, and higher than the land within it. Some hill tops near it are thickly wooded, others are green and cultivated. 5

A reef, dry at low water, extending 2 cables off-shore, between Ujong Rigas and Tanjong Rambong, eastward of it, with a narrow ledge with depths of $3\frac{1}{2}$ to 4 fathoms extending southward of it, across the entrance to the northern harbour. 10

Pulo Rangas (Ranga), lying about $1\frac{1}{2}$ miles south-westward of Tanjong Rigas, is a small rocky island 59 feet high, and covered with trees, which are visible for a considerable distance. A reef, with a depth of $2\frac{1}{2}$ fathoms, extends about one cable off its north-east side; two rocks above water lie off its south-east side, and a sunken rock, which always breaks, lies half a cable off its north-west side, all of which are steep-to. 15

A rock, 3 feet high, lies east-south-eastward, distant 4 cables, from Pulo Rangas.

Anchorage.—There is fine weather anchorage all round the island, in depths of about 12 fathoms, and small vessels may find shelter, during north-west winds, in the same depth, with the north-east extreme of the island bearing 278° true, distant about one cable. 20

RIGAS BAY, or Lho Rigaih, between Tanjong Rigas and Ujong Lho Jahu, is nearly 2 miles wide, and about the same in length; the coast is for the most part composed of rocky cliffs, excepting the swampy portion on its north-east side. The four islands which encumber it divide the bay into the north and south harbours. The Krung Rigas discharges into the northern part of the bay, and southward of its mouth is the village Lho Timong. 25

South harbour, the larger of the two, is used by all but small craft, being about half a mile in extent, with depths of 5 to 6 fathoms, over sand and mud, and easy of access. It is open to the south-west monsoon, rendering it advisable to moor, but Lho Eh Kabi, a light on the south-east side of it, about 3 cables wide, affords fair shelter even at that season. 30

The north harbour (Lho Timon) has depths of from 3 to 4 fathoms over a breadth of $1\frac{1}{2}$ cables, and is used by small trading craft; it affords fair shelter at all seasons, and, being abreast the town of Rigas (Rigaih), is much more convenient than the south harbour. 35

Pulo Reasam (*Lat. 4° 39' N., Long. 95° 33' E.*), the largest islet, is rocky, wooded, and about 4 cables in length, in a north and south direction by 2 cables in breadth, and inhabited; on the east side there is a flat portion covered with cocoanut trees. A reef surrounds it to 40

General chart 2760.

Plan of Rigas and Chalang bays on 1701. Var. nil.

distances of from one cable to 2 cables, except at its south extreme and a small part of the north coast.

Pulo Anggang, eastward of Pulo Reasam, and Pulo Pengaseh and
5 Pulo Semut within it, are low rocky islets covered with trees and brushwood, and uninhabited; they are all situated within the edge of the irregular coral reef, with depths of less than 3 fathoms, and dry in places, which fills the inner and greater portion of the bay.

Two reefs, with depths of 2 and $2\frac{3}{4}$ fathoms, lie about 3 cables south-
10 ward and south-westward of Pulo Reasam, respectively, and between them and the island there are patches, as charted. Pulo Semut open south-eastward of Pulo Anggang, leads eastward, and Tanjong Rambong open westward of Pulo Reasam, leads westward of them.

Reasam rock, above water, with depths of 9 fathoms close-to, lies
15 between Pulo Reasam and Pulo Rangas, distant 8 cables from the south point of the former; a patch of $2\frac{1}{2}$ fathoms, lying 2 cables, 340° true, from Reasam rock, is also steep-to.

Ujong Lho Jahu and Batu Tenga, the high and rocky promon-
tories covered with trees, on the southern shore, are steep-to, and 546
20 and 359 feet high, respectively. Batu Tenga village is situated on the point of that name.

Anchorage.—Vessels making any stay at Rigas bay are recom-
mended to moor westward or southward of Pulo Reasam, where there
are depths of about 8 fathoms, over sand and mud, as the harbours are
25 notorious for marsh fevers, and the exhalations from the extensive coral flats, which partly dry, and nearly surround them, give rise to an intolerable stench. There is anchorage in the South harbour, in about 5 fathoms, between Batu Tenga and Pulo Anggang. When there is much swell at the anchorage in South harbour, a good berth may
30 be found in Lho Eh Kato, on the south side.

Vessels should moor in all these anchorages. These anchorages are easily accessible, as will be seen on the plan.

Vessels with small crews must be prepared against the treachery of the natives, here and elsewhere, as before mentioned, on page 303.

35 **Directions.**—Gunong Kwali or Rigas hill, described on page 306, is one of the most conspicuous landmarks on the west coast, being visible from a distance of 40 miles in clear weather, and, therefore, a good landmark when approaching Rigas harbour. See view *d* on page 306 and view *b* on 319.

40 To enter the Southern harbour from the northward, it is advisable to pass westward and southward of Pulo Rangas at the distance of about half a mile, when a course may be shaped to pass southward of Reasam rock, which is above water, for Tanjong Lho Jahu. This point is steep-to, and may be passed at about a cable distance, observing that
45 Pulo Semut open eastward of Pulo Anggang leads eastward of the sunken rocks southward of Pulo Reasam.

General chart 2760.

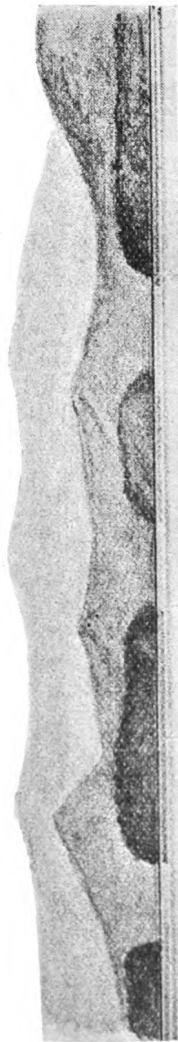
Raja.



(a)

Tanjong Klumpang.

Clearing Mark for Karang Angkatan or Gillis reef. Gunung Raja in line with Tanjong Klumpang leads eastward of the reef.



(b)

Pulo Rasam.

37° true.

Tanjong Chelang.

Rigas Bay. Tanjong Chelang bearing 43° true, distant 3 miles.



(c)

351° true.

Kuala Tenom.

Krung Tenom. Mouth of river bearing 49° true.



(d)

Krung Wailla.

Mouth of the Wailla bearing 17° true, distant 6 miles.

Tanjong Tuba.

Plan of Rigas and Chalang bays on 1701. Var. nil.

Coming from the southward, a vessel should pass westward of the rocks, above water, lying southward of Pasir Besar, with Tanjong Lho Jahu in line with the centre of Pulo Anggang, bearing 0° true, then passing about a cable off the point, steer north-east for the anchorage. 5
The channel within the Pasir islets is used by coasting vessels.

The Northern harbour is only suitable for small craft. The channel between Pulo Reasam and the sunken ridge, with from $3\frac{1}{2}$ to 4 fathoms extending from the north shore reef, is about 2 cables wide.

The town of Rigas (Rigaih), on the northern shore, is one of 10
the principal places for the collection and export of pepper. No supplies are obtainable, there being only sufficient for the inhabitants; the drinking water is unpalatable.

The river can only be ascended by boats for a few miles.

Pasir islets consist of two groups of uninhabited islands, situated 15
about three-quarters of a mile south-westward and southward of Ujong Chalang, in the approach to Chalang bay. The western group consists of four rocky islets of which Pasir Besar is the southernmost and largest, all on the same reef. Pasir Besar has reef, which dries, extending one cable from its western side, with a rock above water on 20
it. Two rocks, above water, lie $3\frac{1}{2}$ cables south-west of Pasir Besar, with a depth of 10 fathoms between them and the island.

The remaining three islets of this group, close northward of Pasir Besar, are on the same reef as that islet.

Two rocks, above water, lie midway in the passage between Pasir 25
Besar reef and the south extreme of Ujong Chalang; a small rock, with a depth of $1\frac{3}{4}$ fathoms, is situated westward of these rocks. The plan shows a rock, apparently above water, in the fairway of the western entrance of this passage, which none but small local craft could use. 30

Pasir Kechil, the northernmost and largest islet of the eastern group, is a bare rock 42 feet high, with some brushwood on it; it is joined to the islet 20 feet high, south of it, by a reef. Some rocks, from 6 to 10 feet high, lie nearly a cable northward of Pasir Kechil. The eastern islet of the group, 13 feet high, is a bare rock. 35

In the passage between the two groups there are depths of from 7 to 8 fathoms, but in the northern part of it there is a patch of 4 feet, and another, on which the depth is $2\frac{3}{4}$ fathoms, at $1\frac{1}{2}$ cables westward of it.

Pasir reef, composed of sand and coral, is about $1\frac{1}{2}$ cables in 40
diameter, has 5 feet least water, and lies about a quarter of a mile northward of the eastern islet of the group; these dangers are all steep-to.

General chart 2760.

Plan of Rigas and Chalang bays on 1701. Var. nil.

CHALANG BAY lies close south-eastward of Rigas bay, separated by the peninsula of which Ujong Lho Jahu and Ujong Chalang form the western and south-east extremes; the latter is high and wooded. Its head is a sandy bay in which is the village of Chalang, with cocoanut palms. A pepper factory, with pointed roof, is seen between the trees.

Buoy.—**Chalang reef**, with a least depth of $1\frac{1}{2}$ fathoms, and 4 to 5 fathoms around, lies $1\frac{3}{4}$ cables eastward of Ujong Chalang; it does not always break; its north extreme is marked by a white conical buoy.

Johore reef, with a depth of 3 feet, lies $2\frac{1}{2}$ cables off the conspicuous tree on the eastern shore, on the edge of the 3-fathoms contour line.

The eastern shore is fronted by huge granite boulders, rendering landing impossible. When the sea is breaking boats cannot approach it within a depth of 4 fathoms.

Anchorage, in about $5\frac{1}{2}$ fathoms water, may be obtained between Chalang and Johore reefs, about 3 cables from the latter; this anchorage is fairly good even during the south-west monsoon, being somewhat sheltered by Pasir islets. The bottom in the bay consists almost everywhere of hard sand, sometimes mixed with stones and coral, and in places covered with a thin layer of mud or clay.

Coast.—From Chalang village the coast trends south-eastward, and is bordered by rocks, which, with the surf, render landing impracticable; the only conspicuous marks on this part of the coast are a conspicuous house south-eastward of which is a tree with a white trunk, and further on a small grove of cocoanut palms, in which Ketapan Pasir village stands at the mouth of the Meriri.

Chart 2760, Acheh head to Chingkuk bay.

COAST. — Rigas bay to Cape Felix. — General remarks.—The coast between Ketapan Pasir, about 3 miles eastward of Rigas bay, and Cape Felix (Ujong Raja, or Teku), a distance of about 77 miles, is of an entirely different character to that to the northward. The most of it is low with a sandy beach, and behind it a uniform row of aroe trees, similar in appearance to the pine tree.

Near Krung Waila (Woila) (*Lat. $4^{\circ} 18' N.$, Long. $95^{\circ} 57' E.$*) there is, or was, many years ago, a wide gap in the trees, covered with brushwood, with a group of higher trees at the back conspicuously visible through the opening. Southward of this point the trees begin again, and continue in a regular line to near Ujong Tuba, about 7 miles beyond, where they cease.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

There is an extensive swamp between the Krung Waila and Krung Bubun, named Raja Demet, which feeds the Laut-Ni lake within it. The Barisan or Gunong Itam range, which runs nearly parallel to the coast, is about 7 miles inland, or farther than on any other portion of the west coast of Sumatra. It is as devoid of conspicuous points as the coast itself. The coast is wooded with cocoanut trees from south of Melabu to the conspicuous wood at the mouth of the Krung Tua; southward of this are isolated aroe trees as far as the mouth of the Teripah.

There are some small streams on this coast navigable by very small craft within the entrances, but the bars are very shallow and treacherous, and only passable at times by those having local knowledge; there appears to be a lull after about every seven rollers.

The coast is, on the whole, free from known dangers, and may be approached by the lead, but it is advisable not to approach within a depth of 10 fathoms, as the bottom shoals rapidly within it. The bottom is sand under 7 or 8 fathoms, and mud beyond. The only charted dangers are those off Tuba and Melabu, and the doubtful dangers off the Teripah, but others probably exist.

Mountains (*continued from page 307*).—Gunong Abong Abong, 11,155 feet high, lies about 33 miles from the coast, north-eastward of Cape Felix; it is slightly curved, dome-shaped summit, only distinguishable from the surrounding mountains by its great height. See view *b* on page 326.

Gunong Gredong (*Lat. $4^{\circ} 10'$ N., Long. $96^{\circ} 38'$ E.*), south-westward of Abong Abong, and about 22 miles from the coast, is supposed to be the only active volcano in the province of Acheh.

COAST.—Krung Sabil (Salie) discharges by two mouths, the Kwala Sawang, the northernmost, and Kwala Kalung, at 5 and 6 miles south-eastward of Rigas bay; Kwala Kalung is available for boats when the wind and swell are favourable for entering.

Krung Panga (*Lat. $4^{\circ} 33'$ N., Long. $95^{\circ} 43'$ E.*), $4\frac{1}{2}$ miles south-eastward of Kwala Kalung, has a village of the same name on its left bank. It is not easily identified, as the only mark is a group of high aroe trees which closely resemble those at the Tenom and Un creeks. The Un creek (Krung On) connects the Panga and Tenom, and is much used for communicating between the two villages.

Krung Tenom, about the largest of these streams, is easily identified by a promontory which from a distance looks like an island, situated about one mile southward of it. Tenom village is on the right bank, within the entrance, which is less difficult to enter than the Panga. (*See view c on page 319.*) The Krung Bakongan, of no importance, lies 4 miles south-east of it.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

Krung Waila (Waila).—The Lambalik is an insignificant stream which has the same mouth as the larger Waila river. The aroe trees extending along the coast from the northward cease near the
 5 north bank of the Waila, rendering the mouth of that river easily recognisable from a considerable distance. The depth or navigability of the Waila is not stated, but is apparently of no importance. See view *d* on page 319.

Plan of Bubun on chart 2760.

10 **BUBUN (Bubon) BAY** (Lat. $\frac{1}{4}^{\circ}$ 12' N., Long. 96° 1' E.), about $1\frac{1}{2}$ miles in extent, within Ujong Tuba, affords good anchorage in a depth of 5 fathoms, sheltered from all winds between west-south-west, through north, to east, within the reefs mentioned below. Bubun
 15 village lies on the west side of the bay, at the head of which the river of the same name discharges. The bay has the advantage of communication with the shore nearly in all weathers. There is a creek or inlet between the reef and the village in which boats can find shelter and landing.

Krung Bubun is the commencement of the great marsh in the upper
 20 part of the Bubun district, extending as far as the Krung Waila (Waila) referred to with the coast on page 320.

Ujong Tuba, the west extreme of Bubun bay, is a low promontory with some peculiar trees resembling mops, but these will not be noticed when coming from the northward. There is also a cocoanut
 25 grove at the village, which may help to identify it.

Reefs.—A coral reef, partly dry at low water, extends 4 cables south-west of Ujong Tuba, and continues along the coast to abreast the village, but at a much less distance. Four small reefs, with depths of less than 3 fathoms over them, lie respectively 323° true, about
 30 7 cables, 296° true, 7 cables, 292° true, about one mile, and 281° true, distant half a mile, from Ujong Tuba. They are generally marked by surf.

Two reefs lie eastward of the point; the southern is 4 cables in length by 2 cables in breadth, with a least depth of 2 fathoms. It is
 35 said to be nearer to the point than it is charted. During bad weather the channel breaks nearly across between it and the point, and it should not be used. The northern reef dries, has a depth of from 6 to 7 fathoms around, and lies one mile eastward of the point.

Plan of Melabu on chart 2760.

40 **MELABU (Mulaboh) BAY**, though of the same shape and nearly the same extent as Bubun bay, affords far less protection, there being no reefs seaward as at that anchorage. The shore of the bay is fronted by a reef which extends to the distance of half a cable off the western mouth of Krung Melabu.

General chart 2760.

Plan of Melabu on chart 2760. Var. $0\frac{1}{4}^{\circ}$ W.

The Kwala Changkul, or western mouth of the Melabu, was originally a canal, but is very shallow; small steam craft cross the bar at high water, and navigate for a distance of about 4 miles to South Mareh village; during the south-west monsoon period the breakers at times render it impossible to enter. The Kwala Marabu, or eastern mouth, is one mile to the eastward of the Kwala Changkul, has less water on its bar, and is usually inaccessible. 5

Ujong Karang (Karueng), the west extreme of Melabu bay, is a low point sparsely covered with cocoanut trees, and the buildings of the settlement will be seen between them. Coming from the southward these buildings render the point easily distinguishable. A coral reef projects about one cable southward of the point, and has three rocks above water on it. 10

LIGHT.—On Ujong Karang (*Lat. $4^{\circ} 8' N.$, Long. $96^{\circ} 7' E.$*), from a white open ironwork frame support, 42 feet in height, a light is exhibited, at an elevation of 49 feet above high water. 15

Dangers.—Five small reefs lie westward of the point; the western has a depth of 2 fathoms, and lies 287° true, distant $1\frac{1}{2}$ miles, from Ujong Karang; the other four have from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms, and lie nearer the shore; the southernmost, with 2 fathoms, lies 207° true, distant half a mile, from the point; they are marked by breakers. 20

A reef about 2 cables in length in an east and west direction, and with less depths than 3 fathoms, lies near the shore, 219° true, distant $1\frac{1}{2}$ miles from Ujong Karang. 25

Anchorage.—There is anchorage in a depth of about 5 fathoms, over sand and mud, with the flagstaff bearing about 281° true, but there are usually rollers setting in, rendering it necessary to be ready to leave it at any moment. The bay is unhealthy, and it is advisable to anchor as far off as possible to avoid the stench of the coral and mudflats. 30

Tides.—The tides are inconsiderable, but occasionally rise as much as one foot.

Dutch station.—The Dutch station and military outpost of Melabu is situated on the right bank of the Kwala Changkul, the western mouth of the Melabu. There is a landing place for boats here, but communication is often rendered impossible on account of the heavy surf. 35

Communication.—The Netherlands Royal Packet Company's steamers, running between Batavia, Padang, Penang, and Singapore, and touching at a number of intermediate ports in Sumatra, call here fortnightly, going and returning. See Chapter I., pages 18, 19. 40

General chart 2760.

Plan of Melabu on chart 2760. Var. $0\frac{1}{4}^{\circ}$ W.

Supplies of fresh provisions and water may be obtained in small quantities, and firewood is abundant.

Trade.—Melabu is a centre for ordinary trade, and has a considerable trade in pepper.

Chart 2760, Sumatra west coast, sheet I.

COAST.—Sungi Senegan or Tua (*Lat. $4^{\circ} 6' N.$, Long. $96^{\circ} 12' E.$*) enters the sea at about $4\frac{1}{2}$ miles south-eastward of Melabu; its mouth is shallow, but it is said to be deep within; there is a well-defined clump of high trees near its south point, which affords also a good mark for Melabu when approaching from the southward.

Krung Terang (Trang) lies 5 miles south-eastward of the Tua; its mouth is also shallow, and a patch of 5 fathoms is charted $1\frac{1}{2}$ miles off it. Some trade is carried on by Terang and Padang villages, the latter 5 miles beyond, at the mouth of the Tadu, a similar stream; off both places there is temporary anchorage in depths of from 5 to 6 fathoms.

Krung Teripah (Tripa) has three mouths, and is available for boats under favourable circumstances; the northern mouth is known as the Teripah, the middle as Sikandang Chut, and the southernmost as Sikandang Rajut.

Doubtful dangers.—A reef, with a depth of 3 fathoms, and 9 fathoms around, is charted about 3 miles westward of the Sikandang Chut, but it was unsuccessfully searched for by H.N.M. vessel Palembang in 1882, and no signs of discolouration or heave were observed, although there was a heavy swell on during the time occupied in the search.

A reef, with a depth of 3 fathoms, the existence of which is also doubtful, is charted south-westward of the southern mouth, and about 2 miles from the coast; it is advisable, when passing near the assigned positions of these reefs, to keep in depths above 10 fathoms.

Sanaam stream, 4 miles north-westward of Cape Felix, is of no importance; it has the village of Kota Pasei on its right bank. A reef lies close inshore between its mouth and Cape Felix.

CAPE FELIX, or Tanjong Raja or Teku (*Lat. $3^{\circ} 43' N.$, Long. $96^{\circ} 32' E.$*) is a very low and rounded promontory, overgrown with brushwood and difficult to identify, but it is free from unknown dangers.

Off-lying reefs.—A coral patch, with a depth of 4 fathoms, lies with Cape Felix bearing 75° true, distant about $14\frac{1}{2}$ miles.

A reef, with a depth of 5 fathoms, $1\frac{1}{2}$ miles in length, in an east and west direction, by half a mile in breadth, and with very deep water around, lies with Cape Felix bearing 47° true, distant 13 miles.

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

A rock, with a depth of 3 fathoms or less, lies with Cape Felix bearing 3° true, distant $12\frac{1}{4}$ miles, and is usually marked by breakers.

A reef, $1\frac{1}{2}$ miles in extent, with a depth of 4 fathoms, lies $1\frac{1}{2}$ miles south-east of the above.

Crimea reef, with a depth of $4\frac{1}{2}$ fathoms, and 32 fathoms around, lies with Cape Felix bearing 307° true, distant 12 miles. It is the north extreme of a group of reefs at least 7 miles in length, and below described.

A patch, with a depth of 3 fathoms, and marked occasionally by breakers, lies 178° true, distant $4\frac{1}{2}$ miles, from Crimea reef; there is a patch of $3\frac{3}{4}$ fathoms, steep-to, about midway between, known as Assahan reef, and surrounded by depths of from 30 to 32 fathoms. The water is discoloured over this patch.

A patch, with less than 3 fathoms, marked by breakers, lies with Cape Felix bearing 318° true, distant $14\frac{1}{2}$ miles, and 4 miles westward, about $1\frac{1}{2}$ miles south-eastward, and 5 miles east-north-eastward of the patch, are shoals with depths of 8, 5, and 5 fathoms, respectively. A patch, with about 6 fathoms, lies about 3 miles south-eastward of Crimea reef. The positions of these dangers, most of which are steep-to, will be best seen by referring to the Admiralty chart, but others, at present undiscovered, may exist.

COAST.—Cape Felix to Tanjong Palikala.—Aspect.

—From Cape Felix the coast trends eastward for about 14 miles, to Susu Susu, then south-eastward for about 60 miles, to Tanjong Kamarang; from which, forming a bight in which Trumon is situated, it trends southward to Tanjong Palikala, abreast the Banjak islands.

The appearance of this coast varies greatly. Eastward of Cape Felix it continues low and sandy, a row of lofty trees appearing between the outlets of the Lama Tua and Lama Muda; thence the coast is hilly, and between Maki and Terbangsan Chut is in many places precipitous. A succession of sand dunes extend along the coast between the mouths of the Kluat, and the sandy coast between the Kluat and Tanjong Kamarang is lined with aroe trees. In the neighbourhood of Trumon the land is marshy. The promontories on this coast render it easy to locate a vessel when within a few miles of the shore, and the mountains should soon be recognised. There are no streams of any importance.

Gunong Lūze (*Lat. $3^{\circ} 44'$ N., Long. $97^{\circ} 7'$ E.*), the highest of the Sinobong range, will easily be recognised by its two very sharp peaks; it is 12,140 feet high, and lies on about the parallel of Cape Felix, at 15 miles from the coast, south-west of it. Bearing about north-east it shows as a saddle. (*See view c on page 326.*) Within 2 or 3 miles of the coast are the following peaks:—

General chart 2760.

Chart 2760, Acheh head to Chinguk bay. Var. $0\frac{1}{4}^{\circ}$ W.

Lok Pau stands somewhat isolated, and may be recognised by its peculiar form, a round hump, which presents the same appearance from nearly all directions. It is the first summit of the coast range,

- 5 which begins a few miles southward of Susu Susu.

Gunong Mangin (Manggeng), the next peak southward, is a green hill 3 miles within the point of the same name. Kumajau, Kubu, Piatu, and Labo Gaja are peaks of the same range, which trends parallel to the coast.

- 10 Gunong Maki (*Lat. $3^{\circ} 27'$ N., Long. $97^{\circ} 6'$ E.*) is high; on its north side it looks like a stairway with one step to it; it lies on the south side of rather a wide valley.

- Gunong Tuan is easily recognised, and is a useful mark when approaching Tampat Tuan. Seen from the southward it shows as a
15 high peak with three lower ones descending like steps to the eastward. View *b* on page 334.

Gunong Terbang Chut (*Lat. $3^{\circ} 10'$ N., Long. $97^{\circ} 17'$ E.*), close to the coast, is a very sharp peak with a steep slope to the southward, and is easily recognised. View *d*, abreast.

- 20 Gunong Belang Balok, 8 miles to the southward, is 4 miles from the coast at the back of the plain through which the Kluat discharges; it shows a slight saddle off this river. View *e*, abreast.

- Gunong Trumon (*Lat. $2^{\circ} 51'$ N., Long. $97^{\circ} 50'$ E.*) lies about 13 miles within Trumon, and when bearing east appears as a high flat
25 summit with almost precipitous sides, but bearing north-east it slopes gently on both sides. Kokohan is a round hill midway between it and the coast. View *f*, abreast.

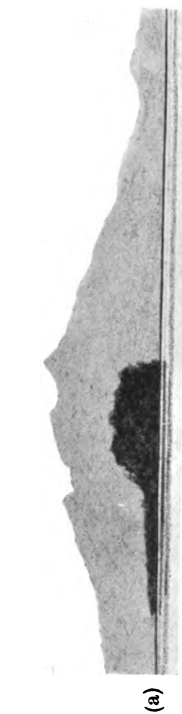
- CAUTION.**—There are several islets off this coast, and numerous isolated dangers, many out of sight of land, which render navigation
30 hazardous. Reefs, with depths of less than 3 fathoms, generally show by breakers or rollers, but others are indicated neither by breakers nor by discolouration of the water. Dangers doubtless exist that are not charted, and some of those known are not correctly placed, as the coast has never been properly surveyed.

- 35 The nature of the bottom changes completely southward of Cape Felix, whereas northward of it the depths decrease regularly, vessels come suddenly into considerable and irregular depths southward of it, which depths will be found close to dangerous shoals. The lead, however, should not be neglected, and a good lookout aloft should always
40 be kept during the day. Night navigation is attended with considerable risk.

- Coast.—Dangers.**—From Cape Felix the coast trends eastward for 11 miles, to Tanjong Arun, off which are several detached reefs with deep water around them. Between Sungi Siserei and Sungi
45 Simanyam, and near the coast, there is a coral reef 2 miles in length

General chart 2760.

Views of coast hills from between Pulo Kas and Susu Susu bay.



(a)

Pulo Kas, bearing 124° true, distant 8 miles.



(b)

View of Gunung Abong-Abong.



(c)

View of Gunung Lûze.



(d)

Terbangan Chut bearing 64° true.



(e)

Gunong Belang Balok bearing 88° true.

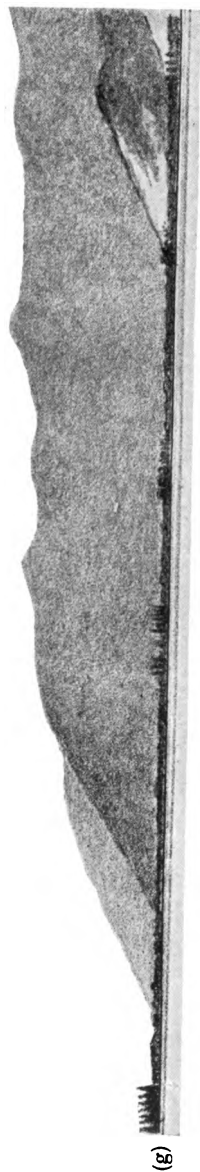
Chelok Batu.



(f)

Kokohan.

Gunong Kokohan bearing 85° true.



(g)

Lama Muda,
 329° true.

Huta Raja,
 358° true.

Pulo Kaju.

Susu Susu.

Off Kwala Batu and Susu Susu bay.

Chart 2760, Achek head to Chingkek bay. Var. $0\frac{1}{4}^{\circ}$ W.

and a cable in breadth, and a rock, with a less depth than 3 fathoms, is situated 106° true, distant one mile, from the Simanyam mouth.

Four small reefs lie between the Surean and Lama Tua mouths, the southernmost and largest being $1\frac{2}{10}$ miles from the shore and south-south-eastward of the former mouth. Both outer reefs are usually marked by breakers. 5

Plan of Kwala Batu and Susu Susu on 2760.

KWALA BATU and SUSU SUSU BAY, situated, respectively, 12 and 14 miles eastward of Cape Felix, afford some protection during the south-west monsoon, being sheltered from north-west winds, which sometimes blow with considerable force, when a heavy roll sets into both these anchorages; the latter bay has anchorage space in a depth of about 4 fathoms, about a quarter of a mile in extent on either side of the one-fathom shoal, with deep water around, situated in the centre of the bay, and it is therefore only available for small vessels. 10 15

Villages.—Kampong Batu (*Lat. $5^{\circ} 45'$ N., Long. $96^{\circ} 44'$ E.*) lies on the west side of the mouth of the Batu stream, and a zinc roofed house near it is a good landmark. 20

Susu Susu village, the houses of which are mostly zinc roofed, lies in the south-east corner of the bay of that name, and the stream near it, and also the Batu, are navigable by boats only. The natives are not to be trusted.

Tanjong Arun, the west extreme of Kwala Batu, is a low promontory easily recognised by the long row of lofty aroe trees extending westward from the point; it has depths of from 8 to 10 fathoms at one cable off it. The mouth of the Lama Muda is 7 cables westward of the point. Small and shallow reefs lie one mile west, and a third of a mile east, of the point, from one cable to 2 cables off-shore. 25 30

Gulau Kaju and Tanjong Seranga are somewhat similar low promontories, both having trees; the latter may be known by several cocoanut stumps and the village standing in a group of trees; they are both fringed by coral reefs extending generally about 2 cables, but south-eastward of Gulau Kaju the reef extends fully a third of a mile. A considerable portion of Tanjong Seranga was submerged by an earthquake in 1861. 35

Beacon.—A beacon, 16 feet high, and surmounted by a white ball, stands 160 yards, 13° true, within the extremity of Tanjong Seranga. 40

Dangers in the approaches.—Lama reef, with a least depth of one fathom, and 25 fathoms around it, is about 4 cables in length; from its centre, Tanjong Arun bears 27° true, distant $1\frac{3}{10}$ miles.

General chart 2760.

Plan of Kwala Batu and Susu Susu on 2760. Var. nil.

Arun reef, about 6 cables in length in a north and south direction, and with 3 feet least water, lies north-eastward of Lama reef; from the northern extreme Tanjong Arun bears 9° true, distant 5 cables.

- 5 About 4 cables eastward of Arun reef is another reef, with 2 fathoms least water.

Berua reef, with 8 feet least water, lies three-quarters of a mile north-eastward of Arun reef, with Tanjong Arun bearing 309° true, distant 5 cables.

- 10 A reef, with a less depth than 3 fathoms, lies 5 cables eastward of Tanjong Arun, and 2 cables from the shore.

- Karang Chano (*Lat. $3^\circ 42' N.$, Long. $96^\circ 43' E.$*), south-eastward of Lama reef, with a depth of 2 fathoms, is half a mile in length in a north-west and south-east direction, and lies with Tanjong Arun bearing 358° true, distant $2\frac{1}{10}$ miles; all these reefs may easily be seen by breakers or a heave of the sea over them.

Potomac and Se Umput, two small coral patches with depths of 5 and 11 fathoms, respectively, lie 65° true, distant 9 cables, and 153° true, distant 8 cables, from the south extreme of Karang Chano.

- 20 Kaju reef, with a depth of one fathom, lies with Gulau Kaju bearing 51° true, distant 6 cables; 3 cables south-east of it there is a coral patch with a depth of 5 fathoms, and 4 cables southward of it another patch, on which the depth is $3\frac{1}{2}$ fathoms.

- A reef, with a depth of $1\frac{3}{4}$ fathoms, lies with Gulau Kaju bearing 99° true, distant 7 cables.

Deli rock, with $3\frac{1}{2}$ fathoms least water, lies with Gulau Kaju bearing 17° true, distant $1\frac{2}{10}$ miles.

- The shoals or coral patches extending 20 miles or more south-westward and southward of Tanjong Seranga, are so numerous that reference to the plan will give a much clearer idea of their various positions than any written description; no vessel should venture near them. The southern patch, with 3 fathoms least water, lies 3 miles, 172° true, from Seranga beacon.

- 35 San Kalan (*Lat. $3^\circ 42' N.$, Long. $96^\circ 47' E.$*), a bank of sand and coral patches, which dries, lies within the above shoals; it is half a mile in length in a north and south direction, its south extreme being 155° true, distant $1\frac{1}{2}$ miles from Tanjong Seranga; fishermen sometimes, for their own use, put up a pole with a white flag on this shoal.

- Anchorage.**—Kwala Batu bay affords anchorage in depths of 17 fathoms, mud bottom, at about one-third of a mile south of Kwala Batu creek; with Gulau Kaju bearing 107° true, and Batu village 358° true, the village lies westward of the mouth of the creek. It is not advisable to anchor in a less depth.

General chart 2760.

Plan of Kwala Batu and Susu Susu on 2760. Var. nil.

Outside Susu Susu bay there is anchorage in a depth of 13 fathoms, mud bottom, with Ujong Seranga bearing 79° true, and Galau Kaju 350° true. Small craft will find better shelter in the bay, off Susu Susu village, in a depth of about 5 fathoms, avoiding the reef which extends 2 cables off the point, and the patch of one fathom situated in the centre of the bay; there is a heavy roll on at times, even there, during the south-west monsoon. 5

Directions.—Approach from seaward on the parallel of $3^{\circ} 40' N.$, which leads between Karang Chano and Crimea reef; the beacon on Tanjong Seranga, if it can be made out, also leads in southward of Karang Chano, which is usually marked by breakers. When the house of the Raja of Kwala Batu, with zinc roof, situated on the left bank of the Kwala Batu, bears 0° true (if it can be distinguished between the trees), steer for it until Seranga beacon bears 47° true, when alter course for it, until at a distance of a mile from the point, when anchorage may be taken as above directed. See view *g* on page 326. 10 15

The Deli rock and reefs near it seldom break, and are steep-to, requiring considerable caution when entering, and there is no discoloration of the water by which they might be seen. Gulau Kaju bearing 0° true leads eastward of the Deli dangers. 20

Chart 2760, Acheh head to Chingkok bay.

COAST.—From Susu Susu bay the coast trends south-eastward for about 7 miles, to North Telok Pau, fronted by the shoals mentioned in the approach to Susu Susu for the first 3 miles. 25

North Telok Pau is a low and steep promontory covered with aroe trees, and may be identified by North Lho Pau, a hill about 2 miles north-eastward of it. A reef projects half a cable off the point. 30

Dangers.—There are three reefs in the vicinity of North Telok Pau, with depths of less than 3 fathoms, and within the distance of 3 miles. They lie, respectively, 320° true, distant $2\frac{3}{4}$ miles; 327° true, $1\frac{1}{2}$ miles; and 210° true, distant $2\frac{1}{2}$ miles from the point, all being surrounded by deep water. The last mentioned is about 2 miles off-shore, has 2 fathoms water, and there is usually a heave over it. 35

A 5-fathoms shoal lies 227° true, distant 5 miles, from North Telok Pau.

Tanjong Mangin (*Lat. $3^{\circ} 35' N.$, Long. $96^{\circ} 54' E.$*) is low and rounded, but conspicuous from the aroe trees on it. View *a* on page 334. 40

Mangin village is situated on the left bank of the river of the same name; the coast reef extends from one cable to $1\frac{1}{2}$ cables off the point. Pau Baru is a small village at the mouth of the river of the same name, $3\frac{3}{4}$ miles south-eastward. 45

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Dangers.—A reef, with less than 3 fathoms, lies half a mile off-shore, at about one mile westward of Pau Baru.

- 5 Suwa Lokau, a reef with 2 fathoms, with a one-fathom patch at half a mile south-east of it, and depths of $4\frac{1}{2}$ to 5 fathoms around, lies one mile from the shore, about $1\frac{1}{4}$ miles, 207° true, of Pau Baru.

Anchorage.—There is anchorage, in depths of from 8 to 9 fathoms, with good holding ground, off the mouth of the Mangin, and in similar depths off the mouth of Pau Baru.

- 10 **Labuan Haji** is a small bay open to the southward, and surrounded by rather high land. The village of the same name lies on its west side, and its tall cocoanut trees are visible from a considerable distance in the offing. There are several villages; Pulo Car lies westward of the west point of the bay, and Kemumu and Bakau near the
15 mouth of a stream to the eastward of the bay.

There is anchorage between two reefs about one mile apart, with Labuan Haji village bearing 20° true, Pulo Car village 354° true, and Tanjong Mangin, 301° true, in from 13 to 15 fathoms, but there is considerable swell here. The bay, northward of the line of its west point
20 bearing 290° true, is foul.

Dangers.—A shoal, with a depth of 6 fathoms, lies in the offing with Tanjong Mangin bearing 348° true, distant 6 miles.

A shallow reef lies with west point of Labuan Haji bearing 65° true, distant $2\frac{1}{2}$ miles.

- 25 Others as charted; it would only confuse the navigator to describe them with such a small scale chart; most of them are generally marked by breakers.

Gosong, a bank of sand and coral, which dries, lies with the west point of Labuan Haji bay bearing 340° true, distant one mile.

- 30 **Pelumat** (*Lat. $3^\circ 29' N.$, Long. $97^\circ 2' E.$*) is a small village on the coast, about 2 miles south-eastward of Kemumu.

Off-lying dangers.—The outer danger off Pelumat, and off the coast southward to Tompat Tuan, is a sunken rock situated with Pelumat village bearing about 100° true, distant $12\frac{1}{4}$ miles.

- 35 There is a similar rock 2 miles eastward of it; both break at times.

From these, shoals stretch north-westward parallel to the coast, as charted.

- A sunken rock is charted with the village bearing 62° true, distant 11 miles. A 5-fathoms patch is charted $2\frac{3}{4}$ miles westward of the
40 latter, and there may be less water.

Between the above dangers and the coast are several shallow cays, mostly within 4 miles of the coast, some of which are marked by breakers, for which *see* the chart; others may exist, and vessels should keep seaward of them all.

- 45 A patch of 5 fathoms lies 222° true, distant 4 miles from Tanjong Maki, with a patch of 4 fathoms between.

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. nil.

A patch of 2 fathoms, steep-to, lies $2\frac{3}{4}$ miles southward of the 5-fathoms patch, with Tanjong Maki bearing 26° true, distant $6\frac{1}{4}$ miles, and 5 miles off-shore abreast South Telok Pau. This patch is the northernmost of a series of reefs 14 miles in length, the southernmost of which is charted position doubtful, with $1\frac{1}{2}$ fathoms water, at 230° true, distant $9\frac{1}{2}$ miles from Tampat Tuan light, or in lat. $3^\circ 9' N.$, long. $97^\circ 3' E.$

Plan of Maki bay on 2760.

MAKI (Muké) BAY (Lat. $3^\circ 26' N.$, Long. $97^\circ 2' E.$) lies between Tanjong Maki and Ujong Batu Tongga, and is open to south and south-west winds, so that there is generally a heavy roll in it; the space is limited, and the coast is hilly. Labuan Tarab village is situated in the southern part of the bay. Tanjong Maki is low and covered with cocoanut trees, with Maki village within it; a reef extends about one cable off the point. Gunong Maki, the high hill within, is mentioned on page 326.

Pulo Serudung, a small, rocky, uninhabited island, lies about half a cable from, and connected by a reef with, the coast, 3 miles southward of Maki, and is not easily distinguished from the southward; nearly a mile southward of the island is Tring Medum village.

Dangers.—The off-lying dangers have been mentioned with those of Pelumat.

The bay has not been closely sounded. The following dangers are charted:—

Karang Gar Bua, a patch of 3 fathoms, with depths of 16 to 22 fathoms at a short distance, lies on the west side of Maki anchorage, with Tanjong Maki bearing 26° true, distant about 6 cables.

Karang Gar Ne, with a depth of 2 fathoms, lies with Tanjong Maki bearing 14° true, distant 2 miles, and Batu Tongga, 76° true.

A rock, with $3\frac{1}{2}$ fathoms least water, and depths of from 7 to 8 fathoms around, lies with Pulo Serudung bearing 128° true, distant 7 cables.

A patch of 3 fathoms lies with the islet bearing 14° true, distant one mile. A shoal, with a depth of 6 fathoms, is situated 6 miles westward of Maki.

Anchorage.—Vessels should not anchor in a less depth than 17 fathoms, where the holding ground, of mud and sand, is good; nearer the shore it is sand or coral; a good position in that depth, over sand and mud, is with Batu Tongga bearing 155° true, and Labuan Tarab village 99° true.

Directions.—On account of the reefs above mentioned, Maki is somewhat difficult of approach, when coming either from northward or

General chart 2760.

Plan of Maki bay on 2760. Var. nil.

southward. The coast should be kept at a distance of 4 or 5 miles, and when Pulo Serudung, southward of Maki bay, is distinguished, course should be shaped to bring it between the bearings of 79° and
 5 45° true; then steer for it until Tanjong Maki bears 346° true, or the islet is about one mile distant, when the point should be steered for, anchoring as before mentioned.

Dangers.—A patch, with a depth of 5 fathoms, lies with Tanjong South Lho Pau bearing 79° true, distant $4\frac{3}{4}$ miles; the fishermen
 10 report a patch of about 2 fathoms as being situated about one mile west of this position; they are probably identical, and should be given a wide berth; it probably breaks.

Two reefs, having a depth of 4 fathoms over them, lie $6\frac{1}{2}$ miles, 265° true, and 242° true, respectively, from Batu Belajar, and a coral
 15 reef, which shows discoloured water, is reported to lie about 62° true, distant one mile from the northern 4-fathoms reef.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

COAST.—South Lho Pau.—South Lho Pau (*Lat. $3^{\circ} 21' N.$, Long. $57^{\circ} 9' E.$*), a somewhat isolated hill, lies $7\frac{1}{2}$ miles south-eastward
 20 of Maki within the point and bay of the same name; Alur Paku, Tring Medum, and Swang Sekuda villages are situated on the coast between it and Pulo Serudung.

The point is low, and eastward of it is the small village of the same name.

Dangers.—A reef with less than 3 fathoms lies with Tanjong South Pau bearing 76° true, distant $5\frac{1}{2}$ cables; a reef, with a depth of
 25 4 fathoms, with the point 9° true, distant 3 cables; and one of 3 fathoms, with the point 30° true, distant $1\frac{3}{4}$ miles. The two shallowest are generally visible from the roll of the sea over them.

Anchorage.—South Telok Pau is open to southerly winds, but
 30 affords temporary anchorage in a depth of 17 fathoms, with Tanjong South Pau bearing 344° true, distant about half a mile; the bottom is not good holding ground in less depths.

Landmark.—Batu Belajar, a white rock situated about 30 yards
 35 off-shore, at 2 miles south-eastward of South Lho Pau, is a good landmark; the point near the rock has a single tree on it. Sama Dua village lies about one mile southward of it. The depths are considerable near the coast, but patches may possibly exist.

Tampat Tuan.—Dangers in the approach.—A patch
 40 of 4 fathoms lies with Tanjong Tuan bearing 92° true, distant 5 miles; a coral patch, with from 3 to 4 fathoms, lies with the same point bearing 72° true, distant 7 miles; these reefs have deep water around them.

General chart 2760.

Chart 2760, Aceh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

A reef, with $4\frac{1}{2}$ fathoms, lies 226° true, distant about 10 miles from Tanjong Tuan. For others, *see* the chart.

Plan of Tapat Tuan bay on 2760.

TAMPAT (TAPA) TUAN BAY (*Lat. $3^{\circ} 15' N.$, $5^{\circ} 10' E.$*), open to southerly winds, and situated between Tuan and Batu Itam points, is rather more than one mile wide in an east and west direction, and divided by Ujong Rokban, on which there is a flagstaff. The western part is encumbered by Gusong Puka, but the eastern, within Gusong Gulu, is clear of danger. 10

The shore of the bay is high and steep, consisting of wooded rocks and high hills, and fronted by a reef in most places, but abreast Tapat Tuan there is a narrow channel through it, with a pier on its eastern side. Telok Bengkuang is the eastern portion of the bay, in which is the village of the same name, Tapat Tuan village being in the western portion. 15

LIGHT.—On Tanjong Tuan, from an open white ironwork frame support, 45 feet in height, is exhibited, at an elevation of 184 feet above high water, a light. *See* Light list.

Dangers.—Batu Tongkat, a rock about 2 feet above high water, with depths of 15 to 30 fathoms around, lies with Tanjong Tuan bearing 95° true, distant nearly one mile. 20

Batavia rock, with a depth of 3 fathoms, lies 340° true, distant 3 cables, and another rock, with possibly less depth, 230° true, distant 7 cables from Batu Tongkat. 25

Batu Kuseah, nearly awash, lies one cable south-westward of Tanjong Tuan, and always breaks.

Gusong Puka, a reef with a least depth of $1\frac{1}{2}$ fathoms, and from 3 to 4 fathoms between it and the shore reef, is steep-to on its south side, and lies in the centre of the west bay of Tapat Tuan. 30

Buoy.—The south-east side of Gusong Puka is marked by a black can buoy moored in 7 fathoms.

Gusong Gulu, with a least depth of 2 fathoms, 19 fathoms close-to, and nearly the same depth in the channel between it and the shore, lies $1\frac{1}{2}$ cables south-westward of Ujong Batu Merah; it usually breaks. Batu Itam are two rocks above water, close off the point of the same name, south-eastward of Ujong Batu Merah, with a depth of 15 fathoms close-to. 35

Anchorage.—There is anchorage in a depth of 20 fathoms, mud bottom, south-eastward of Gusong Puka, about $2\frac{1}{2}$ cables southward of Ujong Rokban; in less depths the bottom is foul, but there is possibly 40

General chart 2760.

Plan of Tampat Tuan bay on 2760. Var. $0\frac{1}{4}^{\circ}$ W.

anchorage for small craft off Tampat Tuan village, northward of Gusong Puka.

- There is no great difficulty in approaching the anchorage, as the
5 reefs are usually visible by the breakers over them. Gunong Tuan
(page 326) is a useful mark.

Communication.—The Netherlands Royal Packet Company's steamers, running between Padang, Penang, and Singapore, call fortnightly. See pages 18, 19.

- 10 **Supplies** are scarce.

Pier.—A pier, 430 feet in length, extends in an easterly direction from the shore, immediately northward of Tampat Tuan village.

Chart 2760, Acheh head to Chingkuk bay.

- COAST.**—**Telok Rukam** (Lat. $3^{\circ} 13' N.$, Long. $97^{\circ} 12' E.$) is
15 the light eastward of a steep and rocky point of the same name, and
which has a depth of 9 fathoms fairly close-to. Rukam and Ayer
Penang villages are situated on the sandy shore of the bay, off which
there is anchorage in from 6 to 8 fathoms. Between Telok Rukam and
the mouths of the Kluat are Rasian and Asahan villages (not shown);
20 there are no charted dangers within 2 miles of the shore, though some
may exist; the following lie off-shore.

Dangers.—A patch, with a depth of 5 fathoms, lies $1\frac{3}{4}$ miles off-shore, with Baru creek bearing 118° true, distant $3\frac{1}{2}$ miles.

- Reefs.**—In the offing, a reef, with a depth of $1\frac{1}{2}$ fathoms, lies with
25 Baru creek bearing 93° true, distant 9 miles, and another with a
depth of 2 feet (1900), with Baru creek bearing 70° true, distant
6 miles. There is a patch of 4 fathoms northward of it.

The outer charted danger, 4 fathoms, lies with the Baru mouth bearing 60° true, distant $11\frac{1}{2}$ miles.

- 30 Discoloured water was reported in 1913 some 5 miles southward of
the 4-fathoms patch, between which and the shore are patches of
5 and 6 fathoms, as charted.

The shallower reefs are usually marked by breakers.

- Sungi Kluat** rises in the Sinobang mountains, runs parallel to
35 the coast for the greater part of its course, and discharges by two
mouths about 3 miles apart; these can only be entered by native boats
by watching the surf until a favourable opportunity occurs. A range
of sandhills forms the coast between the mouths, and a sandbank
extends one mile seaward, which may be approached by the lead to
40 a depth of 7 fathoms.

The northern mouth is named Bak Ur, and has the somewhat large villages of Kedei Acheh and Kedei Melaju (not charted) on either side of the entrance. Toca, the southern mouth, has no village, but that

General chart 2760.

Views of the coast from between Tanjong Mangin and Trumon.

(a)

Tanjong Mangin,
312° true.

Village, 29° true.

Kali.

From Labuan Haji roadstead.

Tanjong
Makih.

(b)

Gunong Tuan.

View from about 3½ miles off Baru. Gunong Tuan bearing 338° true, distant 12 miles.

(c)

Pulo Trumon.

Trumon roadstead southern approach. From near Ajer Hitam reef.

Kokohan.

Trumon.

Gunong Trusa.

Bangkara.

Pulo Timbarat.

Pulo Lamung.

Batu Lanteh.

Banjak islands. Gunong Trusa bearing 166° true, distant 12 miles.

(d)

Chart 2760, Aceh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

of Lembang is situated at the mouth of the stream of the same name, one mile further southward.

Reef.—A reef 2 cables in length, in a north-north-east and south-south-west direction, one cable in breadth, and with a least depth of 3 feet, is reported to exist in the approach to Sungai Kluat. 5

Landmarks.—The sandhills between the mouths of this river form an important landmark, and the plain behind extends farther back than on any other portion of this coast ; Kinja and Belang Balok hills lie within the plain. 10

Terbangan Chut, a green hill on the coast between Telok Rukam and the Sungai Kluat, has two red streaks down its sides, and is conspicuous from the northward ; seen from southward it is densely overgrown and not easily identified.

Tanjong Kamarang and Tanjong Manker are the names applied to the points of the low and rounded promontory situated about 6 miles southward of Sungai Kluat, whence the coast, trending eastward to Bakongan, is fronted by a sandy beach to the distance of 3 cables. As before stated, landing is difficult on this coast even in native boats. 15 20

A patch of $4\frac{1}{2}$ fathoms lies about $4\frac{1}{2}$ miles westward of Tanjong Kamarang, with one of 6 fathoms westward of it, as charted ; they may be identical.

Pulo Manker (*Lat. $2^{\circ} 54'$ N., Long. $97^{\circ} 25'$ E.*), formerly an overgrown islet, is now a sandbank, and covers at times ; it is surrounded by a coral reef, the whole being about 4 cables in diameter, and lies about one mile from the coast ; the passage between has depths of not less than $6\frac{1}{2}$ fathoms, and is generally used by local vessels from the northward when proceeding to Bakongan bay. 25

The islet is known by the natives as Gusong Mangki. 30

Pulo Datu, a sand-cay, surrounded by a coral reef, about 4 cables in diameter, lies one mile, 124° true, from Pulo Manker.

Off-lying dangers.—A reef, with less than 3 fathoms, lies with Pulo Manker bearing 69° true, distant about 6 miles. There are patches of $3\frac{1}{2}$ to 5 fathoms between it and Pulo Manker, and southward of it, as charted. 35

The outer charted reef, with 4 fathoms water (*Lat. $2^{\circ} 46'$ N., Long. $97^{\circ} 21'$ E.*), lies with Pulo Ara bearing 60° true, distant 10 miles. Pulo Ara is a sand-cay situated 7 cables south-west of Pulo Kaju. Midway between it and Pulo Ara is a patch of 2 fathoms ; at nearly a mile, 250° true, from the islet, is a patch of $2\frac{1}{2}$ fathoms, and southward of that patch one of $3\frac{1}{2}$ fathoms. For others, see the chart. 40

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

Pulo Dua, at about half a mile off Dua village, with Pulo Kaju south-east of it, are low sand islets covered with vegetation, and with a few inhabitants engaged in the cultivation of cocoanuts. The islets are fringed by reefs, and in the passage between them there is a depth of 10 fathoms; the edges of these reefs are sharply defined, rendering the passage easy of navigation. Off Dua village there is anchorage in a depth of 12 fathoms.

Bakongan bay is a slight indentation on the coast between Tanjong Manker and Dua, about $5\frac{1}{2}$ miles apart. It affords shelter from north-west winds, with good anchorage, in depths of from 13 to 15 fathoms, mud bottom, off Bakongan village, and half a mile from the shore. Coming from the northward pass between Pulo Manker and the shore, and coast along within the distance of 4 cables; from the southward pass between Pulo Dua and Pulo Kaju (not charted), thence to the anchorage off the village, avoiding charted dangers, and keeping a good lookout from aloft.

A reef, with a depth of one fathom, lies with Bakongan village 31° true, distant one mile; a similar reef with the village 8° true, $1\frac{1}{10}$ miles, and a reef, with a depth of 2 fathoms, with the village 354° true, distant $1\frac{1}{2}$ miles.

Plan of Trumon road on 2760.

COAST.—Sibadi (Lat. $2^{\circ} 53' N.$, Long. $97^{\circ} 31' E.$) is a village in the bight 2 miles eastward of Pulo Dua, between two low points, Dusalim and Sedekat. There is good anchorage at about half a mile off-shore, in depths of from 5 to 6 fathoms. Both points of the bay have reefs around them to a short distance. Silekat village is situated in the bight eastward of Tanjong Sedekat, whence the coast trends southward to Trumon.

A reef of $1\frac{1}{2}$ fathoms lies about one mile south-westward of Silekat village, and about half a mile south-east of it there is another with a depth of 2 feet; both are about 7 cables from the coast.

At about a mile southward of the latter is a reef about half a mile in extent, with $1\frac{1}{2}$ fathoms water, and surrounded by depths of 8 fathoms; the sea usually breaks over these.

TRUMON ROAD. — Pulo Trumon (Lat. $2^{\circ} 48' N.$, Long. $97^{\circ} 35' E.$) is a sandbank overgrown with brushwood, and having a few cocoanut trees, which renders it visible when some miles distant; a reef from 50 to 100 yards wide encircles it. The islet is about 2 miles westward of Trumon village, which has a considerable trade in pepper. View c on page 334.

The stream is only navigable by native boats, and there is usually a heavy surf on the bar and along the coast.

General chart 2760.

Plan of Trumon road on 2760. Var. $0\frac{1}{4}^{\circ}$ W.

Dangers.—The following dangers lie in the vicinity of Pulo Trumon, and on the given bearings and distances from it:—

A reef with less than 3 fathoms, 272° true, distant one mile.

A reef, with 4 fathoms, 212° true, distant $1\frac{2}{10}$ miles. 5

A reef, with 4 feet least water, about 3 cables in length in an east and west direction, and 2 cables north and south, 178° true, distant $1\frac{1}{4}$ miles.

A reef, with a depth of $4\frac{1}{4}$ fathoms over it, 143° true, distant $1\frac{2}{10}$ miles. 10

A large reef, named Medang Ara, on which is a drying rock, 192° true, distant $2\frac{3}{10}$ miles. Eastward of Medang Ara, and outside the 5-fathoms contour line, there are some patches of $3\frac{1}{2}$ to 5 fathoms, otherwise the depths in the channel are from 6 to 7 fathoms.

A reef, with a depth of 4 fathoms, 181° true, distant 4 miles. 15

A reef, about 2 cables in extent, with a least depth of $2\frac{3}{4}$ fathoms, 170° true, distant $4\frac{1}{2}$ miles from the islet.

Ajer Hitam reef, on which the depth is $1\frac{1}{2}$ fathoms, with 7 and 8 fathoms around it, is circular, about 4 cables in diameter, and lies 172° true, distant $6\frac{1}{2}$ miles from Pulo Trumon at $1\frac{3}{4}$ miles off-shore. 20
A patch of 4 fathoms is charted about midway between Ajer Hitam reef and the mouth of the Sibedowah.

These reefs are steep-to, the shallower ones occasionally break, and no dangers are known between these reefs and the shore, the depths, in the fairway, being from $4\frac{1}{2}$ to 5 fathoms. 25

Buoy.—The eastern side of Ajer Hitam reef is marked by a white conical buoy, surmounted by a staff and ball.

Discoloured water has been reported 256° true, distant 5 miles, and 200° true, distant $6\frac{1}{2}$ miles, from Pulo Trumon.

Anchorage. — Directions. — The anchorage off Trumon 30 village is not safe during north-west to south-west winds, as the swell is troublesome even when in a depth of 8 fathoms; light craft seek protection from these winds under the lee of Pulo Trumon, in a depth of about 6 fathoms. Coming from the northward, the islet may be approached when bearing about 112° true, passing northward of it at 35 a prudent distance; a spit extends half a cable off its north end. Trumon peak, in clear weather, and Kokohan peak, 14 and 5 miles inland, respectively, are good marks from the offing.

From the southward, keep close along shore, within the white buoy marking Ajer Hitam and the shoals northward of it, having avoided 40 Heria reef, and the shoals southward of it in the approach. The lead is a good guide, and depths of 5 to 6 fathoms should be maintained. Vessels proceeding northward to Bakongan should also keep close along shore when northward of Pulo Trumon.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay.

COAST.—Between Trumon and Singkel is a wide alluvial plain with nothing but aroe trees, broken at Bula Sama by a couple of cocoanut trees. There is not a single habitation to be seen. The land is low near the beach, and rises inland; at Trumon, where it is low and marshy, the mountain ranges to the northward slope gradually away. The only projecting point to the north of Singkel is Patikala.

Heria reef (*Lat. $2^{\circ} 38' N.$, Long. $97^{\circ} 33' E.$*), with a depth of 2 fathoms, and steep-to, lies about 5 miles off-shore, with Pulo Trumon bearing 10° true, distant $10\frac{1}{2}$ miles.

Karang Laut.—Buoy.—Karang Laut, with a least depth of $2\frac{1}{2}$ fathoms, lies about $3\frac{1}{4}$ miles southward of Heria reef, with Sungi Bula Sama entrance bearing 100° true, distant $3\frac{3}{4}$ miles.

A white conical buoy, surmounted by a staff and ball, is moored, in 10 fathoms water, eastward of the reef.

Amboina reef, with a depth of $1\frac{1}{4}$ fathoms, lies 6 miles southward of Karang Laut, with Pulo Jawi Jawi bearing 210° true, distant $6\frac{3}{4}$ miles (plan on 853).

A reef, with less than 3 fathoms water, lies one mile northward of the mouth of the Ajer Itam, $6\frac{1}{2}$ miles northward of Tanjong Palikala, at about 5 cables off-shore.

Plan of Banjak islands on 855. Var. nil.

BANJAK ISLANDS consist of a group of islands, about 50 in number, extending about 42 miles westward of Singkel, the three largest being Pulo Tunangku, Pulo Bangkaru, and Pulo Ujong Batu, besides which there are many islets with deep water channels interspersed with rocks, between them. See view on the plan and view *d* on page 334.

The native chief of these islands, bearing the title of Chief of Tunangku (Tuangku), lives on Pulo Lamung, on the north coast of Tunangku.

The population is small and scattered; they are mostly people from Acheh, and the rest are a mixture of people from Pulo Nias and the original inhabitants. They subsist on sago—rice is not cultivated; cocoanuts and trepang constitute the chief articles of trade.

Pulo Bangkaru (*Lat. $2^{\circ} 4' N.$, Long. $97^{\circ} 5' E.$*) is mountainous northward of Chameleon bay. Between the high portion and the high south point the land is lower, rendering its appearance, from a distance, as two islands; a reef lying at a distance of 7 cables off its west side, dries in places.

Anchorage.—Chameleon bay, on its south-east side, affords sheltered anchorage from north-west and westerly winds in depths of from 19 to 20 fathoms. A small stream runs down from the north side of the bay, but the water is not good.

General chart 2760.

Plan of Banjak islands on 855. Var. nil.

Reefs.—A reef, with a depth of 2 fathoms, is situated on the southern side of the bay with the southern point of Pulo Bangkaru bearing 246° true, distant $1\frac{1}{4}$ miles. This reef is about $4\frac{1}{2}$ cables in length, with depths of from 7 to 9 fathoms between it and the coast. 5

A patch of 5 fathoms, steep-to, lies about one mile north-east of it.

Channels.—Between Pulo Bangkaru and Pulo Tapak, 24 miles to the westward, the channel is deep and considered to be free from danger; but it is recommended to keep to the Bangkaru side.

The channel between Pulo Bangkaru and Pulo Tunangku is nearly 5 miles wide with deep water, there being no danger apparently beyond half a mile from either island. 10

PULO TUNANGKU, the largest island, is about 17 miles in length in a north-west and south-east direction; on its northern and western sides it is hilly and mountainous, but on the east side low and overgrown with mangroves, with several bays in which there is sufficient depth of water, but the channels leading to them between outlying reefs are mostly dangerous. 15

Gunong Tambaga (*Lat. $2^{\circ} 13' N.$, Long. $97^{\circ} 16' E.$*), on the north point of the northernmost bay on the east coast, is dark-coloured and conical shaped, and Pulo Pangulu and Pulo Dua, lying off this bay, are both high and wooded; Pulo Samut, a small island near the shore to the southward of the above, may be recognised by its dark colour. Southward of Pulo Samut, sunken rocks extend $1\frac{1}{2}$ miles off-shore in places, as charted. 20 25

An island, separated from the south point by Labuan Lulu, appears to be connected with it when seen from the eastward or westward; its south extreme is Tanjong Labuan Lulu. A patch of 5 fathoms lies one mile southward of it. At $2\frac{1}{2}$ miles eastward of it lies Pulo Pinang or Ragged island. 30

Pulo Sorong Alu, situated $4\frac{1}{2}$ miles southward of Pulo Pinang, is nearly a mile in length and surrounded by reef to the distance of about half a mile. The reef surrounding this island is reported (1912) to extend about $4\frac{1}{2}$ miles in a south-easterly direction beyond its charted limit. 35

The west coast of Pulo Tunangku is generally steep, with some high hills and points.

Naveh bay, on the south-west coast, about 9 miles from the south point, is $1\frac{1}{2}$ miles in length, narrow, with sunken reefs extending off both points of the entrance. The depths at the entrance between the reefs are about 10 fathoms, decreasing gradually to 3 and 4 fathoms, over sand and mud, and good anchorage may be obtained in the latter depth; two streams discharge into the bay. A high table-topped hill marks the north side of the entrance. 40

General chart 2760.

Plan of Banjak islands on 855. Var. nil.

Tanjong Selinga, the west point of Pulo Tunangku, is the west extreme of a promontory 5 miles in length, terminating in a low point. The north coast of the island is mountainous and fronted by numerous islands and dangers; Gunong Batu Lanteh, 827 feet, and Gunong Trusa, 1,063 feet high, are two conspicuous hills on this coast; the latter has a sugar-loafed peak, as in view on plan.

Dangers.—A patch of 7 fathoms (not on Dutch plan) is charted at 2 miles westward of Tanjong Selinga, with deep water around. The bottom is very irregular off the north coast of Pulo Tunangku, and vessels should not come within depths of 30 to 40 fathoms when passing it.

A shoal, with a depth of 2 fathoms, lies 313° true, distant one mile from the point below Gunong Batu Lanteh. A patch of 3 fathoms lies between it and Tanjong Selinga, and a patch of 5 fathoms at 1½ miles westward of it.

A patch of 7 fathoms lies with Pulo Timbarat bearing 70° true, distant about 3 miles; another with the same depth is situated 2 miles south-eastward of it, and others may exist near it.

Within a line embracing Pulo Timbarat, Pulo Sikandong and Pulo Kassik are numerous islands and dangers, for which *see* the plan.

Anchorage.—Eastward of Gunong Batu Lanteh there is a bay, on the east side of which is Tunangku village; off it good anchorage may be obtained, in from 6 to 7 fathoms, over soft ground, at about half a mile westward of the south point of Pulo Simo.

Directions.—Approaching this anchorage from the north-westward the best channel, according to the plan, is apparently between Pulo Mandang Kali and the 2-fathoms patch to the westward, approaching the island bearing about 120° true, and giving it a prudent berth.

Approaching from the eastward, pass close along Tanjong Sioleh, southward of Pulo Pabisi coast reef, and along the north coast northward of Pulo Simo to the anchorage. A reef in the fairway southward of Pulo Subang is marked by a beacon placed by the fishermen; farther westward are patches of one and 2 fathoms on the north side of the fairway, as charted.

Pulo Ujong Batu lies nearly 9 miles north-eastward of Tunangku, and is about 5 miles in length, with islets extending about the same distance southward.

Channels.—Between the numerous islets and reefs extending about 6 miles north-eastward of the northern portion of Pulo Tunangku and Pulo Ujong Batu, is a deep channel about 2½ miles in width, which turns to the eastward between the islets southward of Pulo Ujong Batu and Pulo Balambak Besar. *See* view on plan.

General chart 2760.

Plan of Banjak islands on 855. Var. nil.

Eastward of the reef and foul ground extending about 2 miles north-eastward of Pulo Ujong Batu, is a channel nearly 4 miles wide, said to be one of the best passages between the Banjak islands, but there are two shallow heads charted in the fairway and two others of which the positions are doubtful. 5

Directions.—See Directions for outer routes, page 304.

Pulo Jawi Jawi or Passage island (*Lat.* $2^{\circ} 23' N.$, *Long.* $97^{\circ} 32' E.$), the north-eastward of the Banjak islands, lies 10 miles eastward of Pulo Ujong Batu, and 7 miles westward of Tanjong Palikala on the Sumatra coast; it is low and sandy, with a few shrubs, and may possibly be seen from a distance of 8 miles. Jawi Jawi is situated on the east end of a reef, which is 5 miles in length in an east and west direction, and 3 miles in breadth. A reef with a depth of one fathom lies $1\frac{1}{2}$ miles south-east of its south extreme. 10
There is a deep channel, about $1\frac{1}{2}$ miles wide, between it and the shoals fronting the main, the western edges of which are nearly awash. 15

A patch of $1\frac{1}{4}$ fathoms lies about one mile south-east of the extreme of the reefs forming the eastern side of Jawi Jawi channel; 20
and Arumpanjang, a patch of $3\frac{1}{4}$ fathoms, lies on the eastern side of the channel at $6\frac{1}{2}$ miles, 137° true, from Pulo Jawi Jawi.

A patch, on which the depth is $4\frac{1}{2}$ fathoms, lying 16° true, distant $1\frac{1}{2}$ miles from Pulo Jawi Jawi and in the northern approach to Jawi Jawi channel. 25

Inshore channel.—The shoals, which lie eastward of the deep-water channel and occupy a space of $3\frac{1}{2}$ miles in breadth between Pulo Jawi Jawi and Tanjong Palikala, have on their eastern side a reef, between which and Tanjong Palikala there is a channel $1\frac{2}{10}$ miles in breadth. 30

A patch of 2 fathoms lies 314° true, distant $2\frac{1}{2}$ miles, from Tanjong Palikala, and the bottom is foul between it and Amboina reef of $1\frac{1}{4}$ fathoms before mentioned.

Buoy.—The reef forming the western side of the inshore channel is marked, on its eastern side, by a white conical buoy, surmounted by a staff and ball, moored in 9 fathoms. 35

DIRECTIONS.—Vessels from the northward bound to any of the ports north of the equator should proceed by one of the passages between the Banjak islands and the Sumatra coast. That close along the coast of Sumatra, now having a buoy to mark the western dangers, is reported to be safe, avoiding charted dangers, but the one close eastward of Pulo Jawi Jawi is usually taken. 40

General chart 2760.

Plan of Banjak islands on 855. Var. nil.

Jawi Jawi channel (Lat. $2^{\circ} 25' N.$, Long. $97^{\circ} 27' E.$).—In steering for this channel from the northward, keep about 9 or 10 miles off the coast until Pulo Jawi Jawi is seen, then steer towards it, observing never to bring it to bear more easterly than 135° true, to avoid getting near the shoals and irregular depths, extending about 5 miles to the westward of it.

Having approached Pulo Jawi Jawi within a distance of 3 miles, bring it to bear 158° true, which will lead westward of the $4\frac{1}{2}$ -fathoms patch, and when three-quarters or half a mile off the island, alter course to pass about that distance eastward, to avoid the shoals between it and Tanjong Palikala. The reef encircling Pulo Jawi Jawi is dry all round to the distance of a cable at low water, and projects about a quarter of a mile, or rather more in some places, but is not visible at high water. By preserving the distance mentioned the depths will be tolerably regular, and never less than 10 or 12 fathoms, mostly rocky bottom.

A good look-out from the masthead is requisite when passing through this channel, as the coral shoals may be discerned in clear weather, but the flat surrounding Pulo Jawi Jawi cannot always be distinguished. When through the channel, which is about 2 miles in length, the island must be kept between the bearings of 338° true and 327° true, astern, as within these bearings a vessel may anchor if the wind or tidal stream be unfavourable; but northward of the island anchorage should not be taken up under 20 fathoms, for the ground there is rocky under that depth.

Inshore channel.—Coming from the northward, and having passed inside Karang Laut, Tanjong Palikala steered for bearing about 166° true should lead between Amboina reef and the coast, keeping near the coast until near Tanjong Palikala. This point has depths of from 7 to 8 fathoms about a cable off it, and the channel between it and the white conical buoy, marking the eastern reef from Pulo Jawi Jawi, is a mile wide. Having passed this, bring Tanjong Palikala to bear 350° true astern, and keeping it on that bearing will lead eastward of Arumpanjang, and westward of the buoy marking Singkel spit.

Channels on either side of Pulo Ujong Batu.—There is a channel nearly 4 miles wide, with depths of 17 to 30 fathoms, between Pulo Jawi Jawi reef and the reef extending north-eastward of Pulo Ujong Batu. In approaching from the northward, bring Pulo Balambak Kechil well open eastward of Pulo Ujong Batu, and steer for it when bearing 176° true, which leads about midway between Pulo Ujong Batu and the reefs outlying Pulo Jawi Jawi reef; alter course to about 160° true from abreast the centre of Pulo Ujong Batu; the depths should not be under 14 fathoms. A good look-out should be kept from the masthead for uncharted dangers.

General chart 2760.

Plan of Banjak islands on 855. Var. nil.

The westernmost channel between Pulo Ujong Batu and Pulo Kassik appears easy of navigation, though no soundings are shown in its northern approach, but it is undoubtedly deep. From the northward, Pulo Kassik may be approached bearing about 170° true, and when within 2 miles of it, course should be altered to pass one mile westward and southward of Pulo Rongit Besar; when the latter bears 5° true steer 85° true, keeping Gunong Trusa open northward of the two islets situated on the north-west part of the flat extending from Pulo Balambak, bearing about 270° true, or Gunong Tambaga 265° true. (See view on plan.) When Pulo Balambak Kechil bears 190° true, course may be altered to the south-eastward.

Plan of Banjak islands on 855, and Singkel road on 2284.

SINGKEL ROAD (Lat. $2^{\circ} 15' N.$, Long. $98^{\circ} 25' E.$) lies southward of the mouth of the river, between Ujong Brang Bang and Ujong Bawang (Raja), with depths of 7 to 10 fathoms, open to the southward. View *a* on page 348.

Dangers.—Singkel spit, a sand spit stretching about $2\frac{1}{2}$ miles south-westward from Tanjong Singkel, marked by tree stumps in places, is said to be extending and dangerous to approach, and should therefore be given a wide berth.

Buoy.—A black conical buoy, surmounted by a staff and ball, is moored, in about 14 fathoms, on the south-west edge of the spit.

Daphne reef, about $1\frac{1}{4}$ cables in extent, of coral, with a depth of 6 feet, is steep-to, being surrounded by depths of from 11 to 14 fathoms; it lies with Ujong Brang Bang bearing 14° true, distant $2\frac{1}{4}$ miles, and Tanjong Palikala in line with Ujong Singkel. It is only distinguished with a westerly or south-west swell, and is not marked by discolouration of the water.

Buoy.—A conical buoy, painted black and white in horizontal stripes, is moored, in 6 fathoms, on the north edge of the reef.

A rock, with less than 6 feet, lies on the edge of the 5-fathoms contour off Ujong Raja, east extreme of the road; this contour lies $1\frac{1}{2}$ miles off the coast, about midway between the rock and the entrance to the river. Reefs which break and bar the entrance to the river extend a short distance off, referred to below.

Lights.—On the eastern shore, at $4\frac{1}{2}$ cables distant north-eastward of Ujong Pasir, a light is exhibited from a white iron framework, at an elevation of 69 feet above high water.

On the outer end of a new pier, 260 feet long, about 140 yards, 233° true, from Singkel light, a light is exhibited.

Anchorage may be obtained in from 8 to 9 fathoms water, over mud and good holding ground, at about one mile, 190° true, from

General chart 2760.

Plan of Banjak islands on 855, and Singkel road on 2284. Var. nil.

Singkel light, or, in a more sheltered spot, at about $3\frac{1}{2}$ to 4 cables westward of the new pier, with light, as shown on plan, in about 4 fathoms.

Tides.—See page 366.

- 5 **Directions.**—A vessel bound to Singkel from the northward, and having come through the channel eastward of Pulo Jawi Jawi, should keep that islet bearing northward of 327° true, astern, to avoid Arumpanjang reef of $3\frac{1}{4}$ fathoms, which bearing also leads clear of Singkel spit; having passed the latter, marked by a black buoy, steer
10 for the anchorage northward of Daphne reef buoy. The lighthouse bearing northward of 30° true leads eastward of the banks extending off the river.

- Or coming by the Inner route, along the Sumatra coast, Tanjong Palikala kept astern, bearing 355° true, will lead eastward of Arum-
15 panjang reef and clear of Singkel spit.

- Singkel lagoon**, a so-called river, about $1\frac{3}{10}$ miles wide in its entrance, between Ujong Pasir and the lighthouse, has two mouths; the western one, near Ujong Pasir, has a low-water depth of about 2 feet; the other and more circuitous route, near the lighthouse, has
20 a depth of $1\frac{3}{4}$ fathoms.

- Within Ujong Pasir the water deepens to 15 to 20 feet for a distance of nearly $1\frac{1}{2}$ miles to Tanjong Sabrang Abrang; here is the entrance to Singkel creek, up which, at the distance of half a mile, is Singkel town, pier, and harbour office, situated on an island in the
25 lagoon. The channel southward of the islet in the entrance, marked by stake beacons, has apparently not less than 5 feet, with a depth of 12 feet off the harbour office.

- The Netherlands Sailing Directions state that constant silting has blocked this channel to the sea, so that the above depths, taken from
30 the plan, are not to be depended on.

Singkel (*Lat. $2^\circ 16' N.$, Long. $96^\circ 45' E.$*) is a small insignificant place with no trade of any consequence, though benzine, camphor, and getah are exported.

- The Government representative of Singkel province resides here;
35 the Customs officer is also the Harbour master. Both to the north and south of Singkel the land is low, overgrown with timber.

Old Singkel, close by, on an unhealthy site, is almost in ruins.

Telegraph.—Singkel is connected by telegraph with Barus, and with the interior by telephone.

- 40 **Communication.**—The Netherlands Royal Packet Company's steamers, running between Padang, Penang, and Singapore, call fortnightly; telegraph by land lines to Tapanuli and to other ports. See Chapter I., pages 18, 19.

Plan of Banjak islands on 855, and Singkel road on 2284. Var. nil.

Supplies of fresh provisions, in small quantities, may be procured and good water obtained.

Chart 2760, Aceh head to Chingluk bay.

SI MUARA GOSONG TELAGA, or Telaga, is situated about 9 miles eastward of Singkel, Ujong Raja forming its west point. 5

Pulo Kassi (*Lat. $2^{\circ} 13' N.$, Long. $97^{\circ} 53' E.$*), situated $2\frac{1}{2}$ miles, 110° true, from Ujong Raja, is merely a low sandbank, over which the sea breaks at high water; northward of it in the bay is Pulo Telaga, situated south-westward of a sandbank. At $2\frac{1}{2}$ miles eastward of Kassi reef or sandbank is a sunken rock. 10

Landing is difficult in the bay, as the whole shore is generally breaking, but it may be effected eastward of Ujong Raja.

Anchorage.—A vessel, intending to remain a considerable time, should anchor in a depth of 5 fathoms, mud bottom, on the west side of Pulo Telaga, being here sheltered by the land from westerly winds and by the reefs at the entrance of the bay from south-east winds. 15

Vessels can also anchor further in, in 5 fathoms, mud, westward of Pulo Telaga. 20

Directions.—In approaching from the westward, Ujong Raja, the west point of the bay, should be passed in depths of 8 or 9 fathoms, over hard bottom, to avoid the reef which extends about a mile off it. Eastward of the point the bottom becomes soft, when course should be altered to pass north-westward of Kassi reef. 25

COAST.—From Telaga bay the coast takes a south-easterly direction for a distance of 25 miles to Ujong Silabi, whence it turns eastward, forming Tapus bay. There are several small islets near the shore and numerous shoals extending from 10 to nearly 20 miles off-shore, the principal of which will now be described. 30

The coast is low and densely wooded, and there are no conspicuous points; three unimportant streams discharge here, and their mouths are marked by surf. The islets are all low, and, excepting Telaga, are covered with cocoanut trees. The coast is sparsely populated.

Pulo Sikandang lies 5 miles eastward of Pulo Kassi, at 2 miles off-shore. At $3\frac{1}{4}$ miles south-east of Pulo Sikandang is Pulo Birahan, low, thickly overgrown, and surrounded by a broad reef. At 8 miles south-east of Sikandang and about one mile off-shore, is Pulo Mankirgedung, with an islet about midway between them. Between Mankirgedung and Pulo Panjang are other small islets. 35
40

Inshore anchorages.—**Pulo Panjang** (*Lat. $2^{\circ} 6' N.$, Long. $98^{\circ} 8' E.$*), situated $1\frac{1}{2}$ miles off-shore, and 6 miles northward of

General chart 2760.

Chart 2760, Acheh head to Chingluk bay. Var. nil.

Ujong Silabi, has good anchorage protected from all winds, in depths of $5\frac{1}{2}$ fathoms, between it and the shore; the island should have a berth of 3 cables when entering, to avoid a small reef off it. Reefs, some
5 nearly dry at low water, extend $2\frac{1}{2}$ miles south-east of Pulo Panjang.

Directions.—The approach to the anchorage is dangerous from seaward, but there is a channel near the coast between Ujong Silabi and the reefs extending southward of Pulo Panjang, available by those locally acquainted, but the published chart is on too small a scale to
10 offer directions for it.

Small craft can evidently proceed along shore northward from Panjang anchorage to Singkel. There is anchorage between Mangkir Gedang and Birahan, and also between the latter and the shore in 8 fathoms, clay, protected from westerly and south-westerly winds.
15 Pulo Birahan is a low island covered by cocoanut trees and surrounded by a reef one cable wide. A course 47° true for Van Maurik mountain from seaward (view *b* on page 348, and *a* on page 351) leads between Haai reef and the one-fathom patch 4 miles south-south-east of it, clear of dangers. There are no objects by which the position
20 of a vessel can be fixed.

Dangers.—The following are the outermost dangers off the coast between Singkel and Ujong Silabi, on the north-east side of the channel between them and the reefs lying north-eastward of Pulo Lakotta; this channel forms the best route along the coast. Between the follow-
25 ing dangers and the shore there are numerous reefs, the positions of which will be best seen by reference to the chart.

South Daphne reef (*Lat. $2^\circ 9' N.$, Long. $97^\circ 53' E.$*).—The northern of these reefs, situated $5\frac{1}{2}$ miles, 146° true, distant $5\frac{1}{2}$ miles from Ujong Raja, has a depth of 2 fathoms and the southern a depth
30 of $1\frac{1}{4}$ fathoms; a rock with less than 6 feet is situated close westward of the southern reef.

Buoy.—A black conical buoy, surmounted by a staff and ball, is moored, in 7 fathoms water, westward of the 6-foot rock.

Janus reef, composed of coral, with a depth of $1\frac{1}{2}$ fathoms, and
35 showing discoloured water, lies 95° true, distant 5 miles from South Daphne reef, and between are several coral patches having depths of $1\frac{1}{2}$ to 4 fathoms. There are several reefs between Janus reef and the shore.

Haai reef, 195° true, distant about 3 miles from Pulo Pabiharan,
40 off Sungi Silabuhan, has a depth of $3\frac{1}{2}$ fathoms. Half a mile, 350° true, from it, is a sandbank, and 2 cables, in an east-south-east direction from this bank, there is a rock which breaks at times. Northward of this danger are two reefs which show discoloured water; the eastern is $1\frac{1}{2}$ miles southward of Pulo Sikandang.

General chart 2760.

Chart 2760, Achek head to Chinguk bay. Var. nil.

Kameleon reef (*Lat. 2° 6' N., Long. 98° 0' E.*), with a depth under 6 feet, on which discoloured water shows plainly, lies with Pulo Panjang bearing 83° true.

Hippomene reef, with a depth of less than 6 feet, lies with Pulo Pandang bearing 72° true, distant $6\frac{1}{2}$ miles. Annadyomene reef, of coral, on which the depth is $4\frac{3}{4}$ fathoms, lies 18° true, distant 5 cables from Hippomene reef.

Doris reef, with 3 fathoms water, lies with Pulo Pandang, bearing 54° true, distant $6\frac{1}{2}$ miles.

Argo reef, with less than 6 feet water, lies $2\frac{1}{2}$ miles, 85° true, from Doris reef. A reef, on which the depth is $2\frac{3}{4}$ fathoms, lies 343° true, distant $1\frac{7}{10}$ miles from Argo reef.

The reef situated $1\frac{7}{10}$ miles, 343° true, of Argo reef has a depth of less than 6 feet.

Boreas reef, with a depth of $1\frac{1}{2}$ fathoms, lies 2 miles, 115° true, from Argo reef. Van Speyk reef, the southernmost of this group, with a depth of 5 fathoms, lies 167° true, distant 5 cables from Boreas reef, with Tanjong Silabi bearing 80° true, distant $6\frac{1}{4}$ miles.

PULO LAKOTTA (*Lat. 1° 51' N., Long. 98° 0' E.*) is situated near the centre of a number of reefs about 17 miles in extent in a north and south direction from Circe reef to Pylades lighthouse, and about 15 miles in an east and west direction, with Tanjong Singkel bearing 326° true, distant 31 miles, and Tanjong Silabi, abreast it, distant 18 miles. It is a small low island, covered with cocoanut trees, which may be seen from a distance of 11 miles, and is fringed by a reef which on the western side extends for a distance of 3 cables.

Channel.—Between Circe reef, at the north end of the group of reefs, and Doris reef, the outermost of those extending from Tanjong Silabi, is a deep channel 7 miles wide, used by vessels proceeding along the Sumatra coast from either direction, between Tanjong Singkel and Pulo Mansalar. The black buoys on Raja Udat and South Daphne reefs, if in position, afford some guide.

A reef, the existence of which is doubtful, is charted in the fair-way, in lat. 2° 5' N., long. 97° 48' E., or 319° true, distant $17\frac{1}{2}$ miles, from Pulo Lakotta.

Burong reef, situated 5 miles, 354° true, from Lakotta, is rendered conspicuous by the surf breaking on it; it consists of sand, coral, and stones, some of which dry, is surrounded by a reef which is three-quarters of a mile in length in an east and west direction, and may be often seen breaking.

Outlying dangers.—The following dangers lie in the neighbourhood of Pulo Lakotta.

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. nil.

Circe reef, the northernmost of these dangers, with a least depth of $1\frac{1}{4}$ fathoms, lies $3\frac{1}{2}$ miles north-westward of Burong reef, with Pulo Lakotta bearing 156° true, distant $8\frac{1}{2}$ miles, with several detached
5 reefs between.

The easternmost charted danger, $1\frac{1}{4}$ fathoms, lies with Pulo Lakotta bearing 290° true, distant $11\frac{1}{2}$ miles. Isolated reefs are charted 2 miles eastward of a line joining Circe reef to this patch; on the western side of this group of reefs a line joining Circe reef to Pylades
10 reef, and on the southern side from Pylades reef to the $1\frac{1}{4}$ -fathoms patch above mentioned, embraces the reefs charted, but the space westward of Pulo Lakotta has not been surveyed.

Pylades reef.—The northern reef, which uncovers, is situated $8\frac{1}{2}$ miles, 200° true, from Pulo Lakotta, with the lighthouse bearing
15 140° true, distant 3 miles.

LIGHT (*Lat. $1^\circ 41'$ N., Long. $98^\circ 0'$ E.*).—From a white iron framework erected on the south Pylades reef, a light is exhibited, at an elevation of 51 feet above high water. See view c on page 362.

Pulo Dua, 16 miles south-south-eastward, and the reefs between
20 it and Pulo Mansalar, are described with that island.

COAST (*continued from page 345.*)

Plan of Tapus road on 855.

TAPUS ROAD.—Ujong Silabi (*Lat. $2^\circ 3\frac{1}{2}'$ N., Long. $98^\circ 15'$ E.*) is the west point of Tapus road, which is considered to be a better
25 anchorage than Baros, 5 miles further eastward.

Ujong Silabi protects this anchorage from north and westerly winds. Boats can land easily at the point where the shore reef at Ujong Silabi terminates. There is a depth of 2 feet in the mouth of the river, whose banks are uninhabited; round the bay a shallow flat
30 of sand and mud extends for nearly half a mile within a depth of 3 fathoms.

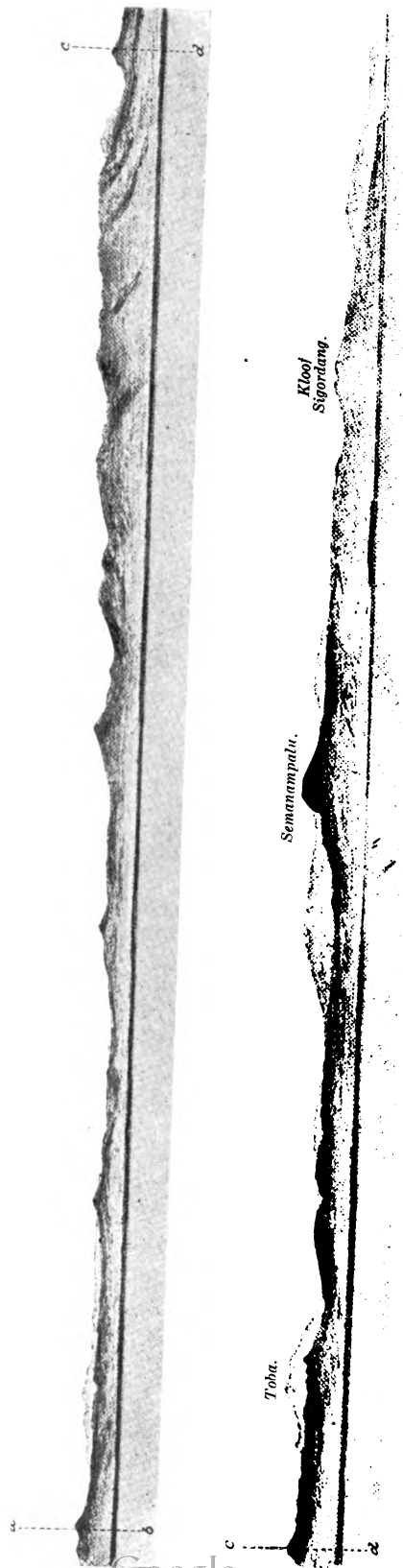
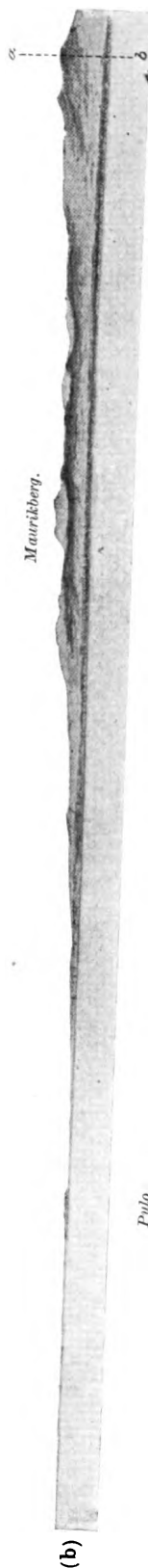
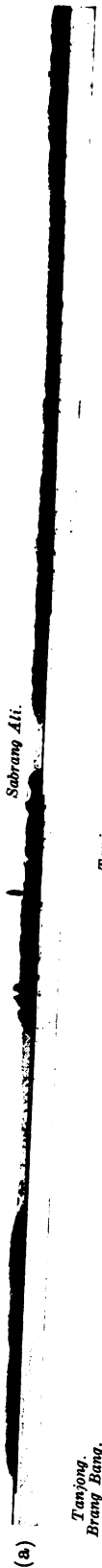
Supplies.—Wood and water may be obtained here.

Chart 2760, Aceh head to Chingkuk bay.

Dangers in the approach. — Raja Udat reef
35 (*Lat. $1^\circ 58'$ N., Long. $98^\circ 13'$ E.*) consists of three coral reefs about a cable in diameter, of which the outermost, with $4\frac{1}{2}$ fathoms least water, lies with Ujong Silabi bearing 19° true, distant 4 miles, and the north extreme of Pulo Karang 81° true. The shoalest spot,
40 $3\frac{3}{4}$ fathoms, lies three-quarters of a mile north-eastward of it. About midway between these reefs and the point is a reef with 2 fathoms water. View b of the coast on page 362.

General chart 2760.

Views of the coast from Singkel to abreast Raja Udat reef.



View of the coast from near Raja Udat reef buoy.

Ujong Karang.

Pulo Karang.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Buoy.—A black conical buoy, surmounted by a staff and ball, is moored, in 6 fathoms water, on the south-west edge of the outer reef.

Plan of Tapus road on 855.

Ujong Binoang reef, a circular shoal about 2 cables in diameter, has less depths than 2 feet, and lies on the east side of Tapus road, about one mile south of the river mouth. It is marked by discolouration.

Anchorage may be obtained in depths of from 4 to 6 fathoms, sand and mud bottom, at about one mile, 237° true, from the mouth of Kwala Tapus.

Plan of Baros on 2760.

BAROS (Barus) (Lat. $2^{\circ} 1' N.$, Long. $98^{\circ} 21' E.$) is an unimportant place at the mouth of the Sungai Pasar Terendam. The Chinese quarter appears to be prosperous. It is healthy compared with Singkel and Sibolga, and is the permanent residence of the Government representative. The office of Harbour master is performed by the Customs official. Ujong Karang, a tongue of land projecting to the south-west, and fringed with a coast reef, forms the west side of the road, and on the east side is a drying reef stretching for nearly $1\frac{1}{2}$ miles in a south-west direction from Baros; its south-east side is marked by stake beacons, in from 2 to 3 fathoms water.

Pulo Karang, low, wooded, and with a small sandy beach on its eastern side, lies $1\frac{1}{2}$ miles southward of Ujong Karang, and has a shoal, with a depth of about 2 fathoms, about 3 cables off its south-west point, and Siwa reef, which dries in places, about the same distance off its north-west side.

Anchorage.—The roadstead is open and unsafe. The usual anchorage is in about 5 fathoms, with Ujong Karang bearing 293° true, and Baros flagstaff 17° true, distant about 2 cables outside the 3-fathoms contour, and $1\frac{1}{2}$ miles from Baros pier.

Large vessels should anchor in 9 fathoms, at about half a mile eastward of Pulo Karang, protected from westerly squalls, and at 3 miles from the pier.

Landing is made possible by a pier which is somewhat protected by a reef on which there are nearly always heavy breakers. Small steam craft can get alongside, the best approach being from along the beach from the eastward.

Directions.—The best route between Singkel and Baros is passing well south-west of South Daphne reef buoy, and Raja Udat reef buoy.

General chart 2760.

Plan of Baros on 2760. Var. nil.

Tides.—It is high water, full and change, at Baros, at VIIh. 0m.; springs rise about 3 feet, neaps range $1\frac{1}{2}$ feet. See Tides, page 30.

Communication.—The Netherlands Royal Packet Company's steamers running between Padang, Penang, and Singapore, call every fortnight, and there is telegraphic communication. See Chapter I., pages 18, 19.

Water.—Fresh water may be procured, but it is imprudent for a boat to enter the river without a native guide.

Trade.—The principal exports are camphor, india-rubber, gutta percha, rattans, buffalo hides, and benzine.

Chart 2760, Aceh head to Chingkuk bay.

COAST.—Aspect.—Northward of Tapanuli bay the coast assumes a different aspect from that southward of it. The mountain range recedes, and near Baros a great plain commences, extending to the northward of Trumon, known as the Singkel and Trumon plain. It is so wide behind Singkel that from the roadstead not a single hill can be distinguished. The range near the coast ends in some hills, of which the Sigordang (kloof of chart, 2,795 feet high) and the Semanampalu are conspicuous.

Mountains.—The western summit of the range, and the highest of three peaks close to one another, is Van Maurikberg, 2,995 feet high, situated northward of Tapus, and 9 miles from the coast; Gunong Toba, 6,736 feet high, 17 miles eastward from Van Maurikberg, and north-eastward of Baros, is 14 miles from the coast, and Gunong Semanampalu, 3,455 feet high, lies $8\frac{1}{2}$ miles southward from Gunong Toba, 3 miles eastward of Baros. In very clear weather, in the morning, or after rain in the evening, the range inland is visible.

Ujong Pannee (Pane) (*Lat. $1^{\circ} 57' N.$, Long. $98^{\circ} 28' E.$*) is situated 15 miles south-eastward of Tanjong Silabi, and has Bilalang and Pane, two small, low islands, lying on the coast reef near it, on which the sea is generally breaking. Between these and Pulo Sorkam the 5-fathoms contour line is 2 miles off-shore, and within it are Karang Gienjang and another reef which break.

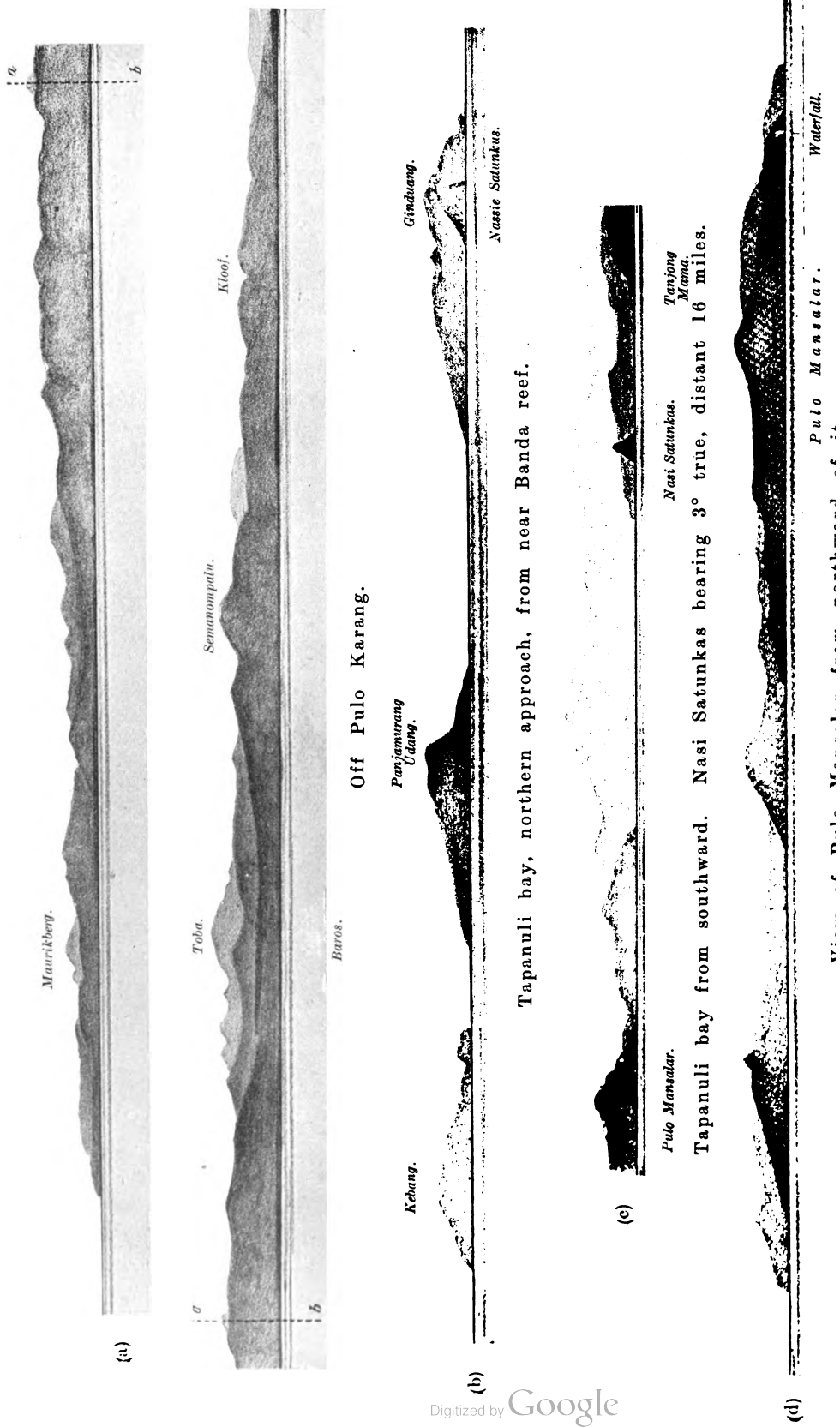
Plan of Tapanuli bay on 855.

Pulo Sorkam, small, low, and surrounded by a reef steep-to, which breaks heavily on its south-west side, lies 6 miles, south-east of Ujong Pannee, and 2 miles off the coast: the channel between the island and the shore has depths of from $3\frac{1}{2}$ to 6 fathoms, towards the island side.

Anchorage.—There is good anchorage eastward of Pulo Sorkam, over clay and sand.

General chart 2760.

Views of the coast from Maurikberg to Tapanuli bay.



Plan of Tapanuli bay on 855. Var. nil.

Water may be procured from Kwala Sorkam abreast the island.

Coast.—From Sorkam the coast continues its south-easterly direction for 15 miles, to the north point of entrance to Tapanuli bay.

TAPANULI BAY, between Ujong Karang and Ujong Mama, its entrance points, is 9 miles wide, and its harbour of Siboga (Sibolga), in the northern part, forms the most sheltered and secure anchorage on the west coast of Sumatra. Ujong Batu Buro (Buruk), within Ujong Karang, the northern point, is of considerable height.

Pulo Nassie Satunkus (Tungkus Nasi), or Suikerbrood (Lat. $1^{\circ} 36' N.$, Long. $98^{\circ} 40' E.$), a conical-shaped islet, 590 feet high, lies $1\frac{1}{2}$ miles off Ujong Mama, and is a conspicuous object when approaching or leaving Tapanuli bay by the southern channel. The west side of the island is clear of danger, with a small sandy beach, but the eastern side is surrounded by a coast reef; close south-east of the island is Sambal rock.

Pulo Bakal, lying half a cable northward of Tanjong Mama, is a small, thickly wooded, rocky island with a reef extending from its north and west sides, and a good landing place on the east side.

Anchorage.—Good anchorage may be obtained close south-eastward of the island, in a depth of 16 fathoms.

Pulo Onggeh (Unggas), 2 miles eastward of Pulo Bakal, and one mile from the shore, is a small low island covered with cocoanut palms, surrounded on its western side by a coral reef, and having a bank of sand and coral extending half a mile from its eastern side.

Villages.—Diaga Diaga village is situated on the eastern shore, at about a mile north-eastward of Gunong Kebang (Kabun), 1,050 feet in height. Halangan, another unimportant village, is situated on this shore. Gunong Tambak Raja, Tombak Ranchang, 1,404 feet high, is situated at the north-east corner of the bay. The small streams on the shore are only available by canoes, and their entrances are usually breaking.

Channels.—The northern channel to Tapanuli bay, between Pulo Mansalar and the Sumatra coast, is 7 miles wide, with depths of from 12 to 20 fathoms on either side of Banda reef. View *b*, abreast.

The southern channel, between Pulo Mansalar group and Pulo Nassie Satunkus, is 5 miles in breadth, free from danger, with regular depths of about 24 fathoms.

Dangers.—Karang Gadang (Gedang), with a depth of $1\frac{1}{2}$ fathoms, lies in the northern approach at $1\frac{1}{2}$ miles off the northern shore, and 130° true, distant $5\frac{1}{2}$ miles from Pulo Sorkam. There is a sunken rock between it and Ujong Kadang, abreast Ujong Pandang.

General chart 2760.

Plan of Tapanuli bay on 855. Var. nil.

- Argo reef, situated 4 miles south-eastward of Karang Gadang, and 7 cables from the shore near Tanjong Pandang, has 2 feet least water, with Pulo Sorkam bearing 315° true, and the north extreme of
- 5 Pulo Mansalar, 258° true.

- Banda reef, lying nearly in mid-channel of the northern entrance, is about 50 yards in extent, has a depth of 5 to 6 fathoms, and is steep-to, being surrounded by depths of from 11 to 15 fathoms, over mud; from it the east point of Pulo Sorkam bears 338° true, distant $8\frac{1}{4}$ miles, and
- 10 the north extreme of Pulo Mansalar 259° true. View *b* on page 351.

A rock with a depth of $1\frac{1}{2}$ fathoms lies 2 cables southward of Tanjong Karang, in the approach to Tapanuli harbour.

- Several dangers lie near the shore, on the east side of Tapanuli bay, as charted. Karang Sibangon, the only one named, consists of two
- 15 patches, situated $1\frac{1}{4}$ miles south-west of the point under Gunong Tambak Raja; they are awash at low water. The reef lying about half a mile westward of Tanjong Gunong Tua has a depth of 9 feet. A detached reef lies 213° true, distant $1\frac{3}{4}$ miles from Tanjong Gunong Tua. For others in the southern part of the bay, near the shore, see
- 20 the plan. As a rule all these reefs break.

Plan of Tapanuli harbour on 855.

- Tapanuli or Siboga (Sibolga) harbour**, an extensive inlet on the north side of Tapanuli bay, is subdivided into many coves by islands, where a large number of vessels may lie sheltered from all
- 25 winds in depths of 6 to 9 fathoms, with not less water in the approach. The basin north-west of the head of the harbour has depths of $2\frac{1}{2}$ to 3 fathoms, and would contain a considerable number of small craft.

Siboga is an open port, and the seat of the Dutch resident for the western provinces.

- 30 **Islets.—Ponchang Gedang** (*Lat. $1^{\circ}43'$ N., Long. $98^{\circ}44'$ E.*), the largest islet, is 377 feet high, about three-quarters of a mile in extent, and lies between the entrance points of the harbour, rather nearer the eastern shore, and has some steep hills covered with timber, near the foot of which there are several springs of fresh water. The
- 35 island is encircled by a reef, on the north side of which lies a small island named Banki; on the eastern side, the reef fronting the bight is narrow, but off it lie two reefs, Karang Gedang and Karang Paka, with 3 feet water over them, which break slightly at times. There are villages on its north-west side.

- 40 **Ponchang Kechil**, about 50 feet high, and covered with cocoanut palms, lies nearly one mile north-westward of Ponchang Gedang, with depths of 10 fathoms between; the island is surrounded by a reef, which on the north side is narrow, and here are the coal stores where good landing may be effected.

General chart 2760.

Plan of Tapanuli harbour on 855. Var. nil.

Pulo Panjang lies northward of Pulo Ponchang Kechil, with depths of 8 fathoms in the channel between. The north end of Pulo Panjang is nearly connected to the shore by reefs, with Pulo Babi off the northern point. 5

Anchorage.—In the outer portion, eastward of Ponchang Gedang and Ponchang Kechil, there are depths of from 7 to 8 fathoms for about 2 miles in length by one mile in breadth, and there is also good anchorage in 6 to 8 fathoms north-westward of Ponchang Kechil; the bottom is chiefly blue mud. The inner harbour, or basin, about 10 one mile square, affords anchorage in depths of from 2 to 3 fathoms, with from 3 to 4 fathoms in the narrow approach to it, and a rock with about one foot water in the fairway at about 4 cables within.

Anchorage can also be obtained in 5 fathoms water, about $1\frac{1}{2}$ cables off the pier at Siboga in a fissure or creek in the shore reef. The 15 channel is marked by white basket beacons on the starboard hand and black basket beacons on the port hand.

Light.—At night a light is shown at the north end of the creek for the use of small craft locally acquainted.

Directions.—Tapanuli bay and harbour may be safely 20 approached by passing on either side of Pulo Mansalar group, thence westward of Pulo Ponchang Gedang, and on either side of Pulo Ponchang Kechil according to circumstances; anchorage may be taken in 7 or 8 fathoms water, over soft bottom, in any of the positions previously mentioned. At night, the light shown at the head of Siboga 25 creek, bearing 50° true, from abreast Ponchang Kechil, leads to and between the beacons marking the entrance to the creek anchorage at Siboga. View *c* on page 351.

Tides.—It is high water, full and change, at Tapanuli, at VIh.; 30 springs rise about 6 feet. *See* Tides at pages 30 and 366.

Settlements.—Siboga (Sibolga), the Dutch Residency, lies on the eastern shore of the harbour. The town of Tapanuli lies on the river of the same name at the northern head of the harbour, with Pargadungan village near it.

Trade.—Communication.—Siboga promises to become a 35 place of some importance owing to the development of its trade and the adjacent agricultural enterprises. Benzine, coffee, india-rubber, tamar, mats, and rattan are the chief articles exported from the interior. The Customs officer acts as Harbour master. The Netherlands Royal Packet Company's steamers, running between Padang, Penang, and 40 Singapore, call fortnightly, and Siboga has telegraphic communication with Padang and by telephone with the interior. *See* Chapter I., pages 18, 19.

General chart 2760.

Plan of Tapanuli harbour on 855. Var. nil.

Padang Sidimpuan can be reached in a day from Siboga. A moderately-steep road connects Siboga with Tarutung.

Supplies.—The Dutch Government have a small supply of coal, the store being on Ponchang Kechil. Poultry, fruit, and cocoanuts may be procured, and fresh water in the bay northward of Siboga, as charted.

Plan of Tapanuli bay and Pulo Mansalar on 855.

PULO MANSALAR (*Lat. 1° 38' N., Long. 98° 30' E.*) is 11 miles in length in an east and west direction, and lies in the approach to Tapanuli bay and harbour. The island is mountainous, a conical hill, named Hunik, with a conspicuous tree near the north-west end, being 1,480 feet in height. View *d* on page 351.

The hill over Tanjong Pinchaling, the south-west extreme of the island, is 1,673 feet high. Maligi, on the south-east extreme, is 1,243 feet high. Handang, a cone-shaped mountain eastward of Ronto bay, is 1,345 feet high.

On the north side are several inlets; the largest, Ronto (Tanah Ronti) bay, is 3 miles wide, with depths of 15 to 19 fathoms. It nearly divides the island into two portions, the isthmus at its head being a low ridge, only half a mile across.

Reefs extend about a mile off the north-east point of Ronto bay, with a depth of 3 feet, and the shore of the bay is fringed by reef, as charted. At the north-west end of Pulo Mansalar there is a waterfall issuing from a hill at 180 feet above the sea, which forms a good mark when coming from the north-westward.

A rock of $2\frac{3}{4}$ fathoms is situated half a mile northward of the north-west point of this island.

Plan of Mansalar bay on 855.

Mansalar bay, at the south-east end of Pulo Mansalar, has depths of from 10 to 22 fathoms, over soft mud, and fronted southward by a group of islets.

Pulo Talam lies off Tanjong Talam, the west extreme of the bay, with depths of 12 to 16 fathoms between. Pulo Tembarez (Sitanbarat) shelters the bay from westerly winds, and the Labu group somewhat from southerly winds. The latter comprise Labu gedante and Kechil, Pulo Kattiah (Tarika), between them, and Pulo Kalimantan (Kalimantong Kechil), the south-westernmost of the group, all of which are steep-to.

The bay affords good fresh water, and the adjacent islands abound with proa trees, fit for masts or yards of any size that may be required.

ISLANDS and dangers in the offing, between Pulo Nias and Sumatra. — Pulo Dua (Bintanah) (*Lat. 1° 29' N.,*

General chart 2760.

Plan of Mansalar bay on 855. Var. nil.

Long. 98° 10' E.) is situated 17½ miles south-westward of Ujong Pinchalang, Pulo Mansalar.

A reef, which dries in several spots, is situated 4 miles, 307° true, of Pulo Dua, and a shoal of 2¼ fathoms at 2 miles, 297° true, with one of 4 fathoms between it and the islet. 5

A shoal of 2¼ fathoms is situated 7½ miles, 20° true, of Pulo Dua, and from this position a chain of reefs and shoal extend 37 miles to the southward, some of which dry. For positions and depths on others between those mentioned, *see* the chart 2760. 10

Makassar reef, steep-to, and the eastern of the above chain of rocks, uncovers at low water, and is situated 88° true, distant 13½ miles from Pulo Dua, and 9½ miles southward of Tanjong Pinjalang.

Between it and Pulo Dua is a reef partly dry at low water.

Chart 2760, Acheh head to Chingkok bay.

Panjang reef, 3 miles in length, which dries, lies 162° true, distant 27 miles from Pulo Dua, in lat. 1° 3' N., long. 98° 18' E.; it always breaks. There are patches around it, as charted.

Success reef, 13 miles eastward of Panjang reef, was unsuccessfully searched for in 1909 by the Netherlands surveying vessel *Van Gigh*. 20

Lawee reef is charted about 11 miles southward of Panjang reef; its existence is doubtful.

A patch of 5 fathoms (*Lat. 0° 50' N., Long. 98° 16' E.*), reported to break, even in calm weather, is charted 7½ miles westward of the position assigned to the Lawee; is probably identical with it. 25

Directions.—As other rocks may exist in the vicinity, vessels passing eastward of Pulo Dua should keep close over to Pulo Mansalar, which is steep-to, and to the mainland southward of it. If passing westward of Pulo Dua, keep towards the coast of Pulo Nias to avoid the central reefs, which extend southward to about lat. 0° 50' N. 30

COAST.—The coast from Ujong Mama, the south-west extreme of Tapanuli bay, trends in a southerly direction for about 47 miles to Ujong Tabujong, off which there is a lighthouse. It apparently is free from dangers beyond the distance of about one mile; the only reef which lies close to the shore at 6 miles northward of Pulo Ilir, has a depth of 2 fathoms. 35

The mountainous land approaches the coast between Tapanuli bay and Tanjong Tabujong, but it has few conspicuous points.

Pulo Ilir (*Lat. 1° 17' N., Long. 98° 48' E.*), about 13 miles southward of Tanjong Mama, is an island near the coast; it is about one mile in length, 177 feet high, flat and wooded, and affords wood and good water. 40

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. nil.

Anchorage.—There is temporary anchorage, in a depth of 8 fathoms, between Pulo Ilir and the Sumatra coast, the channel being clear of danger.

- 5 The Air Batu Mundam (Mumdom) discharges northward of Pulo Ilir; there is but little surf in its entrance.

Batang Toru discharges at 10 miles northward of Pulo Ilir; there are always heavy breakers on its bar, prohibiting any regular navigation.

- 10 Batang Sinkuang discharges about a mile southward of Batu Ajung, near the village of same name. It is navigable by large native boats for a distance occupying 8 or 9 days. High breakers on the bar make the entrance difficult.

- 15 **Batu Ajung**, a rock apparently above water, lies near the coast, at about 15 miles southward of Pulo Ilir and 14 miles northward of Tanjong Tabujong.

Plan of Tabujong road on 855.

- TABUJONG (Tabujung) ROAD** (*Lat. 0° 51' N., Long. 98° 55' E.*) is partially sheltered by the Tabujong islands, three in number, lying in a north-west direction from Ujong Tabujong, the south-west point of the roadstead. Gunong Batu Sudong, eastward of the roadstead, is a sugar-loaf-shaped hill. See views, abreast.

- 25 **Pulo Sikaladi or Tenga** (Tanga), the outer island, is about 3½ miles north-west of Ujong Tabujong; a reef extends in a north-west direction for 7 cables from Pulo Sikaladi, leaving a passage 5 cables in breadth, and with depths of from 12 to 13 fathoms, between it and Batu Simunu.

- 30 Batu Simunu, a small rock above water, surrounded by reef, lies 1½ miles north-west of Sikaladi, and has depths of 8 to 12 fathoms around it.

Vessels in passing westward of Pulo Sikaladi should give it a berth of 3 miles.

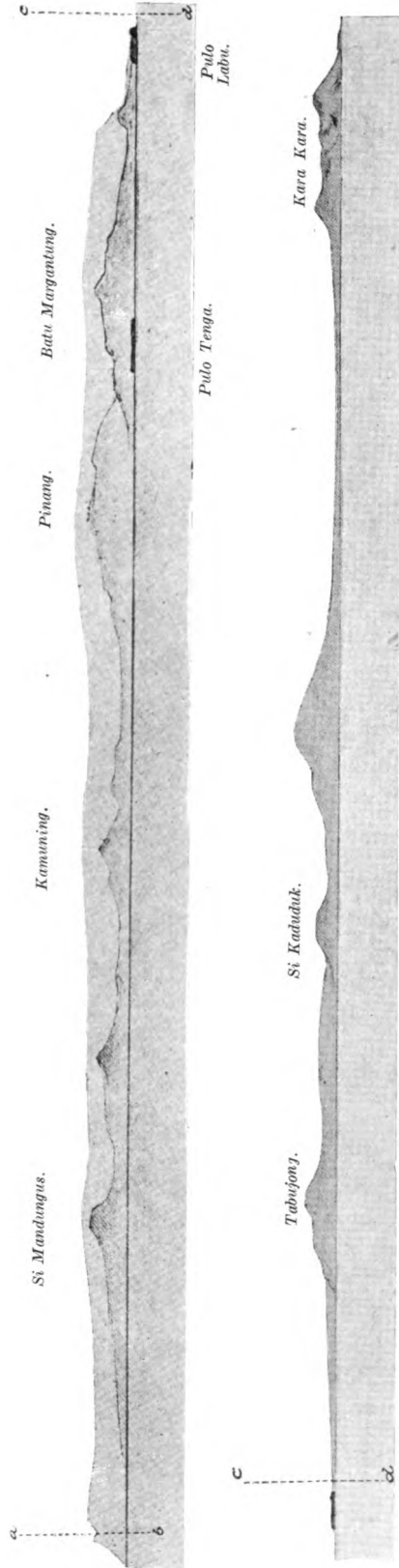
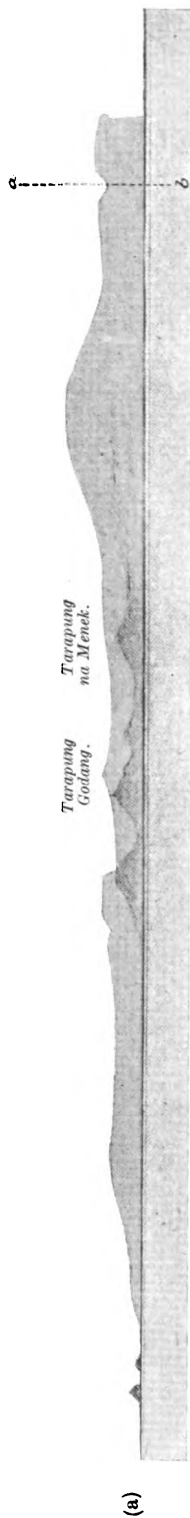
- 35 The islands midway between Sikaladi and the point are Pulo Tabujong (Sidakah) and Pulo Labu, which latter is a small sugar-loaf island with trees and a lighthouse on it.

LIGHT.—On the summit of Pulo Labu, from a white framework, 46 feet in height, a light is exhibited at an elevation of 135 feet.

- 40 **Amboina reef** (*Chart 2760*), about one cable in length in a north-west and south-east direction, and 60 yards in breadth, has a least depth of 1½ fathoms, and lies with Ujong Tabujong bearing 40° true, and Pulo Rinjaman north point 101° true. There is a depth of 6 fathoms close-to, but as the water is not discoloured, caution is necessary in approaching Tabujong road from the southward.

General chart 2760.

Views of the coast from off and near Tabujong road.



View from about 15 miles off Tabujong. Si Mandungus (not charted) bearing 56° true, distant 19 miles.



Plan of Tabujong road on 855. Var. nil.

Anchorage.—There is anchorage at about 4 cables eastward of Pulo Sikaladi, in depths of from 10 to 11 fathoms, clay bottom, or in from 4 to 5 fathoms water, mud bottom, southward or eastward of Pulo Tabujong; both anchorages are fairly sheltered from N.W. winds by the island, with good holding ground. 5

Directions.—Vessels from the northward should approach Tabujong road from along shore, but from the southward they should pass outside Sirene reef.

Tabujong village is situated about a mile within, and northward, of Ujong Tabujong, on the north side of the entrance to the river, 7 cables north-west of which there is a small rock above water, surrounded by depths of 3 fathoms. The bar of the river has depths of from 3 to 4 feet at low water. 10

Supplies.—Good water and cocoanuts may be obtained from the islands. 15

Chart 2760, Acheh head to Chingkul bay.

COAST.—The coast between Ujong Tabujong and Ujong Kara Kara, 13 miles to the southward, is generally avoided, as several shoals lie at a considerable distance from it. Pulo Rinjaman (Ringawan) Gadang, Ketek, Bunja, Tello (Talur), and Kapejong are islands fronting this coast, all of which lie within the 3-fathoms contour line. A mudbank fronts the coast, with several sunken reefs, all within the 5-fathoms contour line fronting it. 20

See Aspect, page 358.

25

Dangers.—**Sirene reef** (*Lat. 0° 42' N., Long. 98° 55' E.*), one of the outermost dangers in this locality, consists of four heads, of which the westernmost and southernmost, with 4 feet water, sometimes break; there are depths of one and 4 fathoms on the other two patches. The outer lies with Pulo Labu lighthouse bearing 6° true, distant 9 miles. 30

There is a passage inshore of the reef, with anchorage, by keeping in 14 and 15 fathoms, but it is preferable to pass outside.

To avoid Sirene reef, a vessel, after passing the Tabujong islands at 4 or 5 miles distant, should keep Pulo Labu lighthouse bearing eastward of 9° true, and not shoal to less than 23 or 24 fathoms until Gunong Kara Kara bears 99° true, which will lead 2 or 3 miles seaward of the reef. 35

Plan of Natal road on 2760.

NATAL ROAD is open and exposed, and has many dangerous shoals; the shore is skirted by a shallow bank, on which a depth of 3 fathoms is found at a general distance of 1½ miles. 40

General chart 2760.

Plan of Natal road on 2760. Var. nil.

Aspect.—The following landmarks are of use to passing vessels, and also for making the anchorage. Gunong Kara Kara (*Lat.* $0^{\circ}38'N.$, *Long.* $99^{\circ}4'E.$), a hill 961 feet high, showing, when seen from the southward, a long ridge and a sharp peak at the outer end, is situated near the northern extreme of Natal road, and with Bandeira hill is a useful mark for clearing the shoals when entering the roadstead.

Bandeira hill (Mandera) or Gunong Natal, about 5 miles south-south-eastward of Gunong Kara Wara, is 358 feet high, and situated on the north side of the river; it is slightly wooded, appears like a wedge when bearing about south-east, and, having low land on either side, is rendered conspicuous.

Batu Kandang is also conspicuous from the southward, appearing as a round hillock with scattered trees on it; not charted. Between Gunong Kara Kara and Ujong Tabujong, 13 miles to the northward, is Gunong Kaduduk, with a conspicuous tree on it. About 13 miles inland is the Sidoa doa (Si Dohar Dohar) range in *lat.* $0^{\circ}44'N.$, *long.* $99^{\circ}15'E.$, the summit of which is 6,158 feet above the sea. See view *b* on page 356, and view *a* abreast.

DANGERS in the approaches.—Off Natal are a number of dangers, most of which are shown on the plan. The mountains above mentioned, Pulo Temang, Pulo Unggas, and the Natal flagstaff are useful marks for avoiding the reefs. The mountains, however, are not visible from the outermost 2-fathoms reef, which breaks 20 miles off-shore, in *lat.* $0^{\circ}30'N.$, *long.* $98^{\circ}46'E.$

Ujong Si Kara Kara, a prominent peninsula, forms the north extreme of Natal road; Pulo Kapejong (Kapechung) lies on the reef, which extends about 3 cables off its north-west side.

A patch of $2\frac{1}{2}$ fathoms lies at half a mile northward of it, and about the same distance westward of the island.

Karang Kapejong, with a depth of $4\frac{1}{4}$ fathoms, and 15 fathoms around, lies 3 miles westward of Pulo Kapejong, with Gunong Kara Kara bearing 96° true.

Karang Pemuda, with a depth of $2\frac{3}{4}$ fathoms, and 11 fathoms around, is situated south-westward of Pulo Kapejong, with Gunong Kara Kara bearing 55° true, distant $3\frac{1}{2}$ miles; a patch of about 5 fathoms lies 5 cables, 214° true, from the reef.

Gusong Kara Kara, a coral reef with a depth of 3 feet, is the only reef in the road which sometimes breaks; it lies with Pulo Kara Kara (Unggas) bearing 40° true, distant about one mile. Two patches with depths of $2\frac{1}{2}$ fathoms over them are situated between Gusong Kara Kara and island.

General chart 2760.

Views of coast in neighbourhood of Natal.

Sidoo-doo.

Kara Kara.

(a)

*Tanjong
Kara Kara.
Batu
Berkendang.*

From off Natal.

(b)

Natal—bearing 90° true, distant 6 miles.

*Sendaran
Gala.*

Kikiran.

Biang.

Tuan.

From between Natal and Gunong Tuan.

Pulo Temang. Lighthouse.

Batahan.

(d)

From South-westward of Pulo Temang; near Karang Bayam.
*Pulo Temang
(Lt. Ho.).*

Plan of Natal road on 2760. Var. nil.

Sabujong Gedang (*Lat. $0^{\circ} 33'$ N., Long. $98^{\circ} 52'$ E.*), over which a depth of $4\frac{1}{4}$ fathoms has been reported, is charted with Gunong Kara Kara bearing 64° true, and the west point of Pulo Tamang 137° true. A small reef, with a depth of 6 fathoms, not breaking, is said to be distant $2\frac{1}{2}$ miles from Sabujong Gedang. 5

A reef, with 2 fathoms water, lies 8 miles, 247° true, of Sabujong Gedang, above mentioned.

A patch of 4 fathoms lies 273° true, distant 6 miles, and one of $4\frac{1}{2}$ fathoms, 354° true, distant 4 miles from Sabujong Gedang. 10

Shaftesbury shoal consists of several reefs with depths of from 2 to 4 fathoms over them, covering a space $1\frac{1}{2}$ miles in length by one mile in breadth between Karang Tete and Ujong Rakit (Rakat); the south-western reef, named Karang Brambang, has a depth of 2 fathoms, and lies with Ujong Rakit bearing 86° true, distant $1\frac{1}{10}$ miles; other patches have from 3 to 4 fathoms, as charted. 15

Karang Siobing, with a depth of 3 fathoms, is the south-easternmost of the group; it lies $7\frac{1}{2}$ cables distant from Ujong Rakit.

Karang Bayam (Bajang), about 3 cables in length in an east and west direction, and 2 cables in breadth, is composed of rock and coral, and has $1\frac{1}{4}$ fathoms least water over it; it lies with Pulo Kapejong bearing 36° true, distant 5 miles; it seldom breaks, but is marked by discolouration. 20

Buoy.—A black and white horizontally striped buoy, surmounted by a staff and ball, is moored, in $5\frac{1}{2}$ fathoms, on the south-east side of the reef. 25

Karang Ponjong, with 8 fathoms water, lies $2\frac{1}{2}$ miles south-west of it.

Karang Laut, with one fathom least water, and 16 fathoms around, lies with Gunong Kara Kara bearing 41° true, distant 10 miles. 30

Karang Kapal, with $1\frac{1}{4}$ fathoms least water over its south-east end, is situated with Gunong Kara Kara bearing 25° true, distant $6\frac{1}{2}$ miles.

Buoy.—A black conical buoy, surmounted by a white triangle, is moored off the western side of the reef in about 10 fathoms. 35

Karang Tete, with a depth of $2\frac{1}{2}$ fathoms, lies $1\frac{1}{10}$ miles eastward of Karang Kapal. Karang Saket Bassi, with a depth of 8 fathoms, lies about one mile southward of Karang Kapal.

Anchorage.—Natal roadstead is one of the worst on the coast, being much exposed to north-west and westerly winds. 40

The usual anchorage is in depths of 4 to 6 fathoms, soft clay bottom, with Bandeira hill bearing about 90° true; vessels can anchor closer in according to draught.

Tides.—See page 366.

General chart 2760.

Chart 2760, with plan of Natal road. Var. nil.

Light.—See Pulo Temang, page 361.

Directions.—Vessels from the northward bound to Natal road, should keep Pulo Sikaladi bearing eastward of 0° true, or Pulo Labu light eastward of 5° true, until Gunong Kara Kara bears 100° true, when Sirene reef will be passed; then steer with Tanjong Tuan, the south point of Telok Italang, in line with Pulo Tamang, bearing 153° true, which leads (if these objects can be seen so far) directly up to Karang Bayam, marked by a buoy; steer in northward of Karang Bayam with Bandeira hill bearing about 104° true, edging a little to the southward, and anchor as before mentioned.

If Tanjong Tuan and Telok Italang cannot be distinguished, with Pulo Sikaladi bearing 0° true and Gunong Kara Kara 100° true, as above, a 153° true course may be steered until Bandeira hill bears 104° true, as before.

At night, Pulo Labu light, bearing eastward of 4° true, until Pulo Telang light bears 153° true, seen from aloft, leads seaward of Sirene reef; Telang light bearing steered for on that bearing will lead just westward of Karang Bayam. If bound to Natal road great caution is necessary unless Bandeira hill can be made out, by which Karang Bayam may be avoided.

Vessels from the southward may also bring Tanjong Tuan in line with the west extreme of Pulo Tamang, bearing 153° true, and, using this as a stern mark, will lead, in depths of $11\frac{1}{2}$ and 12 fathoms, westward of Karang Saket Bassi and Karang Kapal buoy, and when Bandeira hill bears 86° true steer for it to the anchorage.

NATAL stands on the open coast, and was founded by the British in 1762, but with the rest of this portion of Sumatra, was relinquished to the Dutch. It is an open port which does a fairly brisk trade in coffee; camphor, benzine, and gold-dust are the other principal articles of export; the imports are opium, iron in flat bars, salt, piece goods of various kinds, stick-lac, and gunpowder. View *b* on page 358.

Batang Natal, a stream on the north side of which is the town, can be navigated as far as Tapus.

Landing can be effected in the river, but not without difficulty. The bar has a depth of one to 3 feet, with heavy breakers; it is advisable to employ a native.

Communication.—The Netherland Royal Packet Company's steamers running between Padang, Penang, and Singapore call here monthly; there is also telegraphic communication. See Chapter I., pages 18, 19.

TELOK BRAMBANG is the bay, 8 miles in width, situated southward of Natal road, between Ujong Brambang (Sumur), and Pulo Tamang.

General chart 2760.

Chart 2760, with plan of Natal road. Var. nil.

Batahan village lies in the south-east corner of the bay, on the north point of the Batang Batahan, a small river, situated about 3 miles northward of Ujong Palimbungang. It is navigable by boats as far as Barma Sawah, a fair distance up stream. There is a road over the hills to Ayer Bangies. 5

Dangers.—The 3-fathoms edge of the shoal water fringing Natal road, extends upwards of half a mile seaward of Ujong Rakit and Ujong Brambang, and then south-south-eastward into Telok Brambang; it has not been defined much southward of Pulo Durien. 10

Karang Sigale, a patch of 2 fathoms, lies 195° true, distant one mile from Ujong Brambang. Nearer the shore, at one mile eastward of Karang Sigale, is Durien shoal, which always breaks.

Buoy.—A black conical buoy, surmounted by a staff and ball, is moored in 7 fathoms, on the west side of Karang Sigale. 15

Raja Inda, a patch of 3 fathoms, lies 175° true, distant $2\frac{3}{4}$ miles from Ujong Brambang.

Karang Tompe, a patch of 6 fathoms, and from 7 to 9 fathoms around, lies 176° true, distant $2\frac{3}{10}$ miles from Karang Raja Inda. As less water may exist, it should be avoided. 20

Pulo Temang, 144 feet high, is situated at the south-east extreme of Brambang bay, a mile from the coast, and the same distance northward of Tanjong Palimbungang; it is surrounded by a reef, which in places extends $2\frac{1}{2}$ cables, with 6 fathoms close to. There is a village on its eastern side. See views *c* and *d* on page 358. 25

LIGHT (*Lat. $0^{\circ} 22'$ N., Long. $99^{\circ} 4'$ E.*).—From a white iron framework, 72 feet high, on its west extreme of Pulo Temang, a light is exhibited, at an elevation of 213 feet above high water.

Karang Saoni, with a depth of 6 fathoms, lies half a mile westward of the west extreme of the island. 30

Anchorage.—There is good anchorage in depths of 10 or 11 fathoms, over soft clay, between the island and the mainland, with the north point of the island bearing 292° true and Ujong Palimbungang 182° true.

Water.—A well of good water is situated on the island abreast the anchorage, and firewood may be obtained. 35

Directions.—Approaching from the northward, bring Pulo Temang to bear 112° true, or eastward of that bearing, and steer for it, which will lead southward of Karang Laut; give the north point of the island a berth of about half a mile, and haul in for the anchorage on its eastern side, anchoring in about 10 fathoms water. 40

General chart 2760.

Chart 2760, with plan of Natal road. Var. nil.

- There is a safe passage between the island and the mainland, and small vessels coming from the southward, intending to enter Natal road by the inshore passage, may pass in mid-channel between Pulo Temang and the mainland, in depths of from 6 to 10 fathoms. Thence by keeping in a depth of 9 fathoms, the shoals in Telok Brambang will be avoided; and when near Ujong Brambang, by keeping in a depth of 4 to 5 fathoms, a vessel will pass within Karang Siobing, the south-easternmost of the Shaftesbury shoals.
- 10 Vessels with local knowledge can proceed along shore southward to Ayer Bangies road, northward of the white buoy on Tanjong Biang reef (*see* Directions, page 365); others should pass outside the reefs.

Chart 2760, Achek head to Chingkuk bay.

- COAST.**—From Pulo Temang the coast, with a bight between, trends southward for 6 miles to Ujong Tuan, off which is Pulo Robia, thence south-eastward for 3 miles to Biang hill, 725 feet high. Gunong Bargambar or Bagomba (*Lat.* $0^{\circ} 13' N.$, *Long.* $99^{\circ} 12' E.$), 896 feet high, lies 4 miles eastward of Biang, thence the coast trends eastward to Ayer Bangies bay. Isolated shoals extend for a distance of 5 miles off many parts of this coast.

- AYER BANGIES approach.—Aspect.**—The coast to the westward of Ayer Bangies is mountainous as far as Ujong Tuan. The Bargambar mountain, 896 feet high, the double and more rounded Ujong Biang, Tanjong Biang rocky point, and Ujong Tuan mountain are all good landmarks. Northward of Ujong Tuan and Pulo Robia is a shallow bay, the north extreme of which is Ujong Palimbungan, at 2 miles southward of Pulo Temang. This point and Halang within it are spurs of the Sandaran Gala, 969 feet high, within them; this mountain has a flat summit, and can be recognised from a considerable distance. Northward of it are two peaks over the coast; Kikiran, 426 feet high, the northernmost and lower of the two, has a conspicuous tree on its cone-shaped summit. *See* views *c* and *d* on page 358, and *a* and *b* abreast.

- Dangers.**—The following dangers lie to the westward of this part of the coast and in the western approach to Ayer Bangies road. These reefs are sometimes marked by tide-rips, particularly in October and November, when the stream runs from one to 5 knots in a south-easterly direction between Pulo Pinie and the coast of Sumatra.

- Pylades reef** consists of three reefs, with depths of $2\frac{1}{2}$, $3\frac{1}{4}$, and $3\frac{1}{2}$ fathoms, and are generally difficult to distinguish; occasionally they may be discerned by tide-rips or a heave of the sea over them. The southern one is charted in *lat.* $0^{\circ} 20' N.$, *long.* $98^{\circ} 52' E.$, or with Gunong Kara Kara bearing 32° true and Biang hill 107° true.

General chart 2760.

Views of coast from westward of Ayer Bangies; and of Lighthouses on off-lying islands.

Bagomba.



(a)

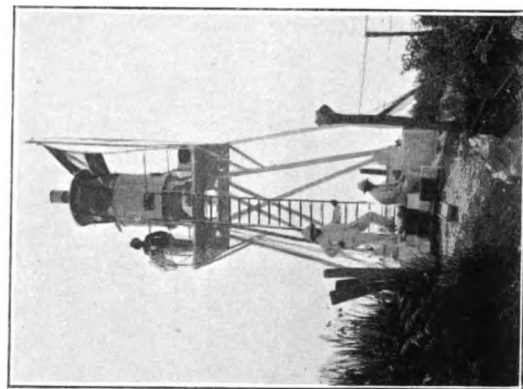
Tuan. Biang.
Ayer Bangies, western approach. Bagomba summit bearing 349° true, distant 4 miles.
Sitangke.
Ophir.

Bagomba.



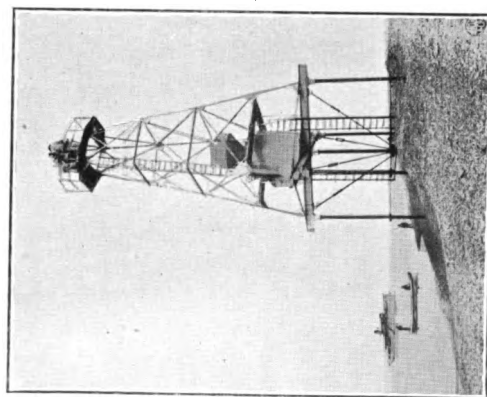
(b)

Batu Badulen.
Ayer Bangies, west approach. Pulo Panjang bearing 95° true, distant 8 miles.
Batu Balayar.
Pulo Panjang.
Pulo Begada.

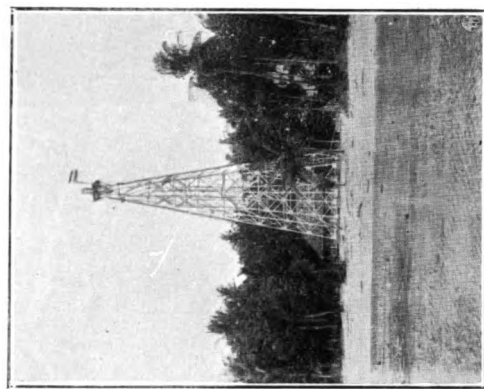


(d)

Pulo Pangkal lighthouse,
off Ayer Bangies.



Pylades Reef lighthouse.



(e)

Pulo Niamuk lighthouse,
south of Padang.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Gunong Bargambar, open north or southward of Ujong Biang, clears these reefs. Reefs westward of the Pylades are included with Pulo Pinie northern dangers, page 446.

Karang Bayam, with a depth of $5\frac{1}{2}$ fathoms, and 14 to 17 fathoms around, lies with the west extreme of Pulo Tamang bearing 20° true, and Tanjong Biang 109° true. 5

A 3-fathoms patch is situated 292° true, distant $1\frac{1}{2}$ miles, and another with a depth of 6 fathoms 287° true, distant $2\frac{1}{2}$ miles from Karang Bayam. 10

A patch with $4\frac{1}{2}$ fathoms is situated 112° true, distant 2 miles from Karang Bayam; eastward of this patch, distant one mile, is situated a shoal of 7 fathoms, and 45° true, distant one mile, a patch of 2 fathoms, which breaks and shows discoloured water.

Midway between Karang Bayam and Tanjong Biang reef is a patch of $2\frac{1}{2}$ fathoms. 15

See view d of the coast on page 358.

Pulo Robia, a small islet, is situated on the edge of the reef extending northward of Tanjong Tuan.

Karang Biang (*Lat. $0^\circ 12' N.$, Long. $99^\circ 7' E.$*), with a depth of $1\frac{1}{2}$ fathoms, which sometimes breaks and is marked by discolouration, is situated $3\frac{1}{2}$ miles southward of Tanjong Tuan; Karang Tuan, on which there is a depth of 8 fathoms, lies 7 cables, 248° true, from Karang Biang. 20

Buoy.—A white conical buoy, surmounted by a staff and ball, is moored in 7 fathoms, on the north-east side of Karang Biang. 25

Labuang Lulu reef, situated $3\frac{1}{2}$ miles, 137° true, from Tanjong Biang reef, has a depth of 3 fathoms; it is not marked by discolouration.

Macassar reef, with a depth of $1\frac{1}{2}$ fathoms, showing discoloured water, but rarely breaking, is about 4 cables in length in a north-east and south-west direction, and lies 248° true, distant 4 miles, from Pulo Pangkal. 30

Chart 2760, Sumatra west coast.

Dangers southward of Ayer Bangies.—Van Speyk reef (*Lat. $0^\circ 1' S.$, Long. $99^\circ 19' E.$*), with a depth of 2 fathoms, and 21 fathoms around, lies with Pulo Pangkal bearing 341° true, distant $9\frac{1}{2}$ miles; this reef sometimes breaks. 35

Moller reef, half a mile in extent, has a depth of $1\frac{1}{2}$ fathoms, and is surrounded by depths of 23 fathoms; it is charted with Pulo Pangkal, bearing 330° true, distant 14 miles. 40

Buoy.—A white conical buoy, surmounted by a staff and ball, is moored, in 10 fathoms, on the north side of the reef.

General chart 2760.

Chart 2760, Sumatra west coast. Var. nil.

Gosong Satu, which dries, lies 7 miles off-shore, with depths of 15 fathoms around, and with Pulo Talur bearing 314° true, distant $8\frac{1}{2}$ miles.

- 5 **Gosong Dua** consists of two reefs about 2 cables apart, which dry and are always breaking; they are surrounded by depths of 12 to 14 fathoms, and lie about 2 miles northward of Gosong Satu.

Sikilang reef is situated about one mile from the mouth of Sikilang river; it has a depth of 6 feet.

- 10 *Plan of Ayer Bangies road on 2760.*

AYER BANGIES (Ajer Bangis) ROAD is about 9 miles across in an east and west direction, between Tanjong Bukit Barlayar and Ujong Sawang Puding. It contains several islands and isolated shoals, as below mentioned.

- 15 Ayer Bangies village is situated on the eastern shore of the bay, off which the depth is about 3 fathoms at one mile distant. The Government representative acts as Harbour master.

- Communication.**—The Netherlands Royal Packet Company's steamers, running between Padang, Penang, and Singapore, call
20 monthly. See pages 18, 19.

Supplies.—Poultry, cattle, and good water can be obtained. Drinking water is obtainable on Pulo Panjang, but it is more convenient to take it from a mountain stream on the left bank of the river. Some coffee is exported.

- 25 **Islands in the road.**—Pulo Pangkal (*Lat. $0^{\circ} 8' N.$, Long. $99^{\circ} 16' E.$*), the south-western island off Ayer Bangies, has a small, sharp-pointed hill, 174 feet high, on its south-west side, but is low to the southward (*see* Light, next page). Pulo Talur, the south-eastern island, is low and covered with cocoanut trees.

- 30 Pulo Pugago, about 2 miles north-westward of Pulo Pangkal, is oblong and covered with cocoanut trees.

Pulo Panjang, 246 feet high, about 2 miles eastward of Pulo Pugago, is a similar island but larger. Landing is easily effected at high water on its eastern side.

- 35 Pulo Kasi, or reef, is about one mile north-eastward of Pulo Panjang.

Reefs.—The following reefs are in Ayer Bangies road:—

- Sikarbau reef**, consisting of two rocks, with a depth of 6 feet, is situated $2\frac{1}{4}$ miles southward of Ujong Sawang Puding; it does
40 not break.

General chart 2760.

Plan of Ayer Bangies road on 2760. Var. nil.

Sylph reef, in this vicinity (not charted), has a depth of 3 feet, and does not break; it is probably that charted eastward of Sikarbau reef.

Two reefs lie from 7 to 10 cables northward of Pulo Talur, and always break; between them and the island there is a depth of 5 12 fathoms.

A reef lies 5 cables eastward of the south point of Pulo Pangkal, and always breaks. A reef is situated 7 cables westward of the north point of Pulo Pugago.

Light.—From a white skeleton iron framework, 26 feet high, 10 erected on the southern hill of Pulo Pangkal, a light is exhibited, at an elevation of 187 feet above high water. See view *d* on page 362.

Anchorage.—The anchorage in Ayer Bangies road is eastward of Pulo Panjang, in depths of 6 to 7 fathoms, over soft clay, at about 4 miles from the town. Small craft can anchor off the town, 15 about one mile from the mouth of the river, with Ujong Labuan bearing 0° true, in about 3 fathoms; but there is always a heavy ground swell here.

Tides.—See Tides, page 366.

Chart 2760, Acheh head to Chingkuk bay.

20

Directions.—From the northward.—Inshore route.

—If intending to take the inshore route from Pulo Temang anchorage southward to Ayer Bangies road, in passing between Pulo Temang and the coast keep rather on the island side; thence in mid-channel between the island and Ujong Palimbungan, and when the latter bears 79° 25 true steer towards Tanjong Tuan to avoid the two reefs lying about 2½ miles west-north-westward of that point.

The 7-fathoms contour line passes near Ujong Palimbungan and also Ujong Tuan, but between these points, and sometimes outside, the depths are less, and the shore, which in this space contains some bays, 30 is safe to approach to depths of 5½ to 6 fathoms.

Plan of Ayer Bangies on 2760.

When Ujong Tuan bears about 90° true steer to pass northward of Biang reef, marked by a white buoy, and entering Ayer Bangies road northward of Pulo Pugago and Panjang, pass between the latter island 35 and Pulo Kasi to the anchorage, as before directed. This passage is undesirable for large vessels, but vessels of every description, by whatever channel they enter Ayer Bangies road, must keep a good lookout aloft for shoals.

Proceeding southward from Ayer Bangies road, bearings of Pulo 40 Talur and other objects will enable a vessel to pass between Moller reef and Gosong Satu, thence for Ujong Masang and Tiko. It may be approached from Tiko by reversing these directions.

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

Outer routes, within the Batu islands.—Vessels from the northward proceeding to Ayer Bangies road, outside the shoals, or to the southward, should from abreast Pulo Temang, distant 7 or 8 miles, steer about 175° true, passing about 2 miles westward of the 6-fathoms patch, west-north-westward of Bayam reef, and when Ujong Biang bears 90° true, alter course to 130° true.

When Gunong Kara Kara is in line with the west point of Pulo Temang, bearing 0° true, course may be altered more to the eastward, to pass north or south of Macassar reef, lying 4 miles west-south-westward of Pulo Pangkal, on a bearing of the light on that island.

The sea breaks on some of the shoals off Ayer Bangies road when there is much swell, and between most of them there are safe channels, but the shoals are not always discernible when the sea is smooth. Pulo Pangkal, bearing 90° true, leads northward of Macassar reef, and between it and Labuan Lulu reef lying 4 miles to the north-westward. Thence pass on either side of Pulo Pangkal to the anchorage, avoiding the shoals in the road previously mentioned. The best channel is northward of Pulo Pangkal, where the depths are 10 to 11 fathoms, over soft bottom.

Sailing vessels proceeding southward from between Ayer Bangies road and Pulo Pinie, bound to Padang or beyond, if without local knowledge, should not attempt to pass between the shoals which extend from 22 miles eastward of the Batu islands to Haaï or Dua reefs (*Lat. $0^{\circ} 30' S.$, Long. $99^{\circ} 37' E.$*), a distance of about 42 miles. The passage eastward of those reefs should be taken, but this is dangerous at night.

Vessels proceeding to Tello roadstead, in the Batu group, should go northward of Karang Laut, situated northward of Pulo Pinie, as the waters southward of it are much encumbered with reefs, and navigation is unsafe except with local knowledge, or with the aid of the Dutch charts. When the west extreme of Pulo Pinie bears eastward of 170° true, a vessel may haul down for the north-east point of Tanah Masa, and proceed along the north coast, avoiding dangers, to Tello Tello.

Tides.—Both systems of tides exist at Ayer Bangies, with a strong double daily predominance. Double-daily springs occur at about 2 days after full and new moon, with high water at about VIIh., and a rise of 3 feet. Neaps occur at the same period after quadrature, at about Ih., with a rise of one foot. Single daily tides occur on 1st January, at about Vh. p.m.; on 1st April, at XIh. a.m.; 1st July, Vh. a.m.; and 1st December, at XIIh. p.m. Springs occur one day after the moon's greatest declination, with a rise of $1\frac{1}{2}$ feet, and neaps one day after moon's declination is nil, with a rise of half a foot. High water springs of both systems occur simultaneously if in the first half

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

of June and December the moon's greatest declination occurs one day after full and new moon. The highest level of the water is then reached at VIIh. a.m., and VIIh. p.m., respectively. The lowest levels occur in the first half of March and September, at Ih. a.m. and Ih. p.m., respectively. If the moon's 0° declination occurs one day after quadrature, the movement of the water is weak for several days.

At Natal, Siboga, Barus, and Singkel the vertical movement corresponds with that of Ayer Bangies. Springs occur at Natal one day, at Siboga 2 days, and at Barus and Singkel $1\frac{1}{2}$ days, after full and new moon. At Barus springs rise 3 feet, and at Singkel 2 feet.

The single daily high water occurs simultaneously at Natal, Barus, Singkel, and Ayer Bangies. At Siboga it occurs one hour earlier. Springs occur at Natal at one day after moon's greatest declination; at Siboga $1\frac{1}{2}$ days before; Barus $1\frac{1}{2}$ days after; at Singkel one day after. Spring rise in all cases about one foot, neaps half a foot. High water springs of both systems can occur simultaneously.

COAST. — Aspect. — Sichangang (*Lat. $0^{\circ} 10' N.$, Long. $99^{\circ} 24' E.$*), a flat-topped hill, 1,166 feet high, lies 3 miles southward of Ayer Bangies, forming the south-east extreme of the road; from it the low coast trends in a general south-east direction for 27 miles, to Ujong Katiagan, forming Pasaman bay; at Ujong Katiagan there is a rocky hill immediately over it. The village is on the south side of the mouth of the river, which has a shallow bar.

Gunong Ophir (*Lat. $0^{\circ} 5' N.$, Long. $99^{\circ} 58' E.$*), of the Barisan range of mountains, about 20 miles north-eastward of Ujong Katiagan, and 9,558 feet high, appears like a cone, separated from the chain of other mountains, and is visible 110 miles in clear weather; it is the highest mountain on Sumatra visible from the sea. Views *a* and *b* on page 378.

The mountain summit near Ophir is named Pasaman, and is 7,186 feet high.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Singalang, a mountain, 37 miles to the south-eastward, is 9,439 feet high.

Gunong Merapi (*Lat. $0^{\circ} 24' S.$, Long. $100^{\circ} 25' E.$*), 9,488 feet high, lies about 7 miles eastward of Singalang. These are all volcanic. See also Aspect of coast westward of Ayer Bangies, on page 362.

Within Ujong Masang there is marshy land, with several hills rising out of it, offering good landmarks for vessels coasting. Referred to under Ujong Masang, on next page.

Between Tiko and Padang the land is everywhere cultivated, and rather densely populated; from Tiko, northward to Natal, the coast has a different aspect, as there is a marshy plain covered with impenetrable bush between Tiko and Ayer Bangies, and in this portion only

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

the foot of Ophir mountain is at all populated. Northward of Natal, between Ayer Bangies and the Dohar Dohar range, the land is higher, whilst still further northward the mountains extend right down to the coast, and surround Tapanuli bay. Another great plain lies between Trumon and Barus, before mentioned.

Ujong Masang (*Lat. $0^{\circ} 18' S.$, Long. $99^{\circ} 48' E.$*), situated about 10 miles south-south-eastward of Ujong Katiagan, is low, with a reef stretching out about half a mile, which should not be approached under a depth of 17 fathoms; Sungai Masang Kiri enters the sea at the point. Within the point are the four Masang hills; Masang, 733 feet high, the eastern and highest, has a flat summit; Antokan, 566 feet, the southernmost, and Labuan, 477 feet high, the westernmost, resemble haystacks; Panji, the northernmost, 339 feet, is crowned by high trees, and forms a good landmark.

Dangers in the channel within the Batu islands.—Southward of the shoals lying in the southern approach to Ayer Bangies road, and westward of Ujong Masang, are many outlying reefs, some of which occasionally break. Others may exist, and a constant lookout from aloft should be kept when in that vicinity.

Fatahul Mobarak reef (*Lat. $0^{\circ} 19' S.$, Long. $99^{\circ} 8' E.$*), with a depth of 2 fathoms, is about 2 cables in extent, and is situated $39\frac{1}{2}$ miles westward of Ujong Masang, and 34 miles eastward of Tanah Masa of the Batu islands.

Two reefs are situated north-westward of Fatahul Mobarak reef, one at a distance of 2 miles, with a depth of $2\frac{1}{2}$ fathoms, the other at a distance of $12\frac{1}{2}$ miles, with a depth of 4 fathoms, as charted.

A reef with a depth of $1\frac{1}{2}$ fathoms is situated 280° true, distant 11 miles from Fatahul Mobarak reef.

Drakes reef, with a depth of about 3 feet, is situated 112° true, distant 7 miles from Fatahul Mobarak reef.

A shoal with 5 fathoms is situated 321° true from Drakes reef at a distance of 3 miles; and bearing 9° true from Drakes reef, at a distance of 8 miles, is a bank with a depth of 8 fathoms.

Pylades reefs.—West Pylades reef (*Lat. $0^{\circ} 23' S.$, Long. $99^{\circ} 20' E.$*) consists of three heads which break; the central head is situated about 6 miles eastward of Drakes reef: from this position, at a distance of about one mile, are situated the other reefs, that to the north-westward with a depth of $1\frac{1}{2}$ fathoms, and that to the southward having a depth of 3 fathoms.

East Pylades reef, which breaks, lies 107° true, distant 4 miles, from West Pylades reef.

Reefs with $2\frac{1}{2}$ fathoms are situated 124° true, distant $4\frac{1}{2}$ miles, and 119° true, distant $8\frac{1}{2}$ miles from East Pylades reef. Northward of the first of these, at a distance of $1\frac{1}{2}$ miles, is a patch of 5 fathoms.

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Dangers.—The following dangers lie between Ujong Masang and Priaman:—

Montrado reef (Karang Sagi) (*Lat. $0^{\circ} 33' S.$, Long. $99^{\circ} 41' E.$*), which breaks, has a depth of 2 fathoms, and is situated 17 miles south-eastward of West Pylades reef, and 208° true, distant $16\frac{1}{2}$ miles, from Ujong Masang. 5

A number of reefs lie adjacent to Montrado reef, as charted, and as the ground is foul others may exist. The existence of the reef at 5 miles south-west of Montrado reef is doubtful. 10

Haai or Dua reefs, situated about $5\frac{1}{2}$ miles north-eastward of Montrado reef, are $1\frac{3}{4}$ miles apart, half a cable and one cable in extent, respectively, and surrounded by deep water, there being from 35 to 40 fathoms between them. On the northern reef the least water is $2\frac{1}{2}$ fathoms, and on the southern the same depth occurs on the northern part. Both reefs sometimes break. 15

A patch of 3 fathoms is situated 287° true, distant $2\frac{1}{4}$ miles from Northern Haai reef, and foul ground extends for a distance of about 14 miles west-north-westward from these reefs.

Ingaris reef (Jugaris) (*Lat. $0^{\circ} 29' S.$, Long. $99^{\circ} 52' E.$*) is about two-thirds of a cable in extent, and has a depth of $1\frac{1}{2}$ fathoms, with from 28 to 30 fathoms around; it lies 215° true, distant $4\frac{1}{4}$ miles from Pulo Ujong, off Tiko. 20

Sungi Lima reef has a depth of $4\frac{1}{2}$ fathoms.

Bajam, with 8 fathoms, and of small extent, lies $1\frac{3}{4}$ miles east-north-eastward from Ingaris reef. 25

Gosong reefs lie $1\frac{1}{2}$ miles off the coast, eastward of Ingaris reef; the larger, $1\frac{1}{2}$ miles in length and three-quarters of a mile in breadth, lies 122° true, distant 4 miles from Pulo Ujong light, and the smaller 115° true, $2\frac{1}{2}$ miles, from the same island. Both have boulders dry at low water, and are marked by breakers. 30

Buoy.—A black conical buoy, surmounted by a staff and ball, is moored, in 7 fathoms water, on the western side of the southern reef.

Batik Besar, with 2 fathoms least water, lies 154° true, distant $6\frac{1}{2}$ miles from Pulo Ujong light; it often breaks, and can easily be made out by the discoloured water. From it the western side of Antokan hill is in line with the east side of Pulo Tangah, off Tiko. 35

Karang Serunching and Batik Kechil lie about one mile south-westward of the foregoing reef, and half a mile from each other. The first is small in extent, hardly ever breaks, and has a depth of 3 fathoms; the latter, with a depth of 2 fathoms, often breaks. They are surrounded by very deep water. 40

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Sungi Bamban reef has a depth of less than 6 feet, and lies $2\frac{1}{2}$ miles eastward of Batik Kechil; it often breaks.

Sungi Lima reef has a depth of $4\frac{1}{2}$ fathoms, and lies $1\frac{3}{4}$ miles, 5 150° true, from Sungi Bamban reef.

Karang Durian, with a depth of 2 fathoms, is situated 246° true, distant about 4 miles, from Pulo Karsik; it seldom breaks or shows discoloured water. The shoals between it and the coast are described with Priaman road.

10 **Selita reef**, with a depth of 4 fathoms, and from 50 to 80 fathoms around, lies 272° true, distant $14\frac{1}{2}$ miles, from Pulo Karsik; there are patches westward of it referred to with Montrado reef.

Two shoals with depths of $3\frac{3}{4}$ and 7 fathoms, respectively, are situated 254° true, distant $3\frac{3}{4}$ miles, and 220° true, distant $1\frac{3}{4}$ miles, 15 from Selita reef.

Lawe reef, with $4\frac{3}{4}$ fathoms, and surrounded by depths of more than 80 fathoms, lies 140° true, distant $5\frac{1}{2}$ miles from Selita reef. A shoal with a depth of $4\frac{1}{4}$ fathoms is situated south-eastward, distant 2 miles from Lawe reef.

20 **Bajam**, two reefs with depths of 3 and $3\frac{3}{4}$ fathoms, lies 313° true, distant $3\frac{1}{4}$ and $4\frac{1}{2}$ miles, respectively, from Pulo Bando.

More uncharted dangers may exist between Haai reefs and Pulo Bando and elsewhere.

Off-lying reefs continued on page 374.

25 *Plan of Tiko road on 2760.*

TIKO (Tiku) ROAD (Lat. $0^\circ 25' S.$, Long. $99^\circ 54' E.$) is in some measure protected by the low islands off it, which are overgrown with cocoanut trees, but nevertheless a heavy swell sets into the anchorage during north-west and south-easterly winds. Tapi peninsula, formerly an island, is now joined to the mainland by a bare sand-ridge, but has the appearance of an island when seen from a distance along shore.

The off-lying islands are three in number, extending in a south-west direction from Tiko and named respectively, from the northward, Pulo 35 Karsik, Pulo Tenga (Tangah), and Pulo Ujong; the latter is about $1\frac{1}{2}$ miles south-west from Ujong Tapi. The whole are fringed by reef. A patch of 8 fathoms lies half a mile south-east of Pulo Ujong light-house.

Dangers.—A reef, steep-to, and about 2 cables in extent, lies 40 in the fairway between Pulo Ujong and Pulo Tenga (Tangah), about 3 cables north-east of Ujong; it dries in places, and is marked by discolouration.

General chart 2760.

Plan of Tiko road on 2760. Var. nil.

A one-fathom patch lies 2 cables northward of Tenga, and a patch of 2 fathoms between Karsik and the reef encircling Ujong Tapi.

Between Tenga and Ujong there is a channel, with depths of 8 fathoms on either side of the drying reef. 5

LIGHT.—From a white framework structure, 46 feet in height, on the west side of Pulo Ujong, a light is exhibited, at an elevation of 46 feet above high water.

Anchorage.—Vessels sometimes run under these islands for shelter during N.W. winds. The best anchorage is in depths of 7 to 8 fathoms, eastward of Pulo Tenga, with the south point of that island bearing 278° true, and the west side of Tanjong Tapi 20° true. Small vessels may anchor, in 3 to 3½ fathoms, sheltered from north-west winds, eastward of the reef extending about 3 cables southward of Tanjong Tapi, which always breaks. 10

Directions from Ayer Bangies, *see* page 365. 15

Pulo Ujong lighthouse should be approached bearing about 90° true, or southward of that bearing, to avoid the numerous shoals in the offing south and south-westward of it, over some of which the swell may be seen to roll if there be any sea. Pass southward and eastward of it to the anchorage. 20

Town.—The town of Tiko is situated within the Tapi peninsula at the mouth of the river, which discharges north or south of the peninsula, according to the season.

Landing may be effected under the lee of the peninsula, but there is considerable surf at times. 25

Plan of Priaman road on 2760.

Priaman road (Lat. 0° 38' S., Long. 100° 6' E.) is situated 17½ miles south-eastward of Tiko road. Vessels can anchor to the eastward of Pulo Ujong or Pulo Tengah (Tangah) in from 3 to 7 fathoms, mud bottom, sheltered from north-west and westerly winds. See view 30
b of the coast on page 378.

Priaman islands, three in number, and named, respectively, from the northward, Pulo Anso, Pulo Tengah (Tangah), and Pulo Ujong, are low and wooded. They lie in a north-north-west and south-south-east direction abreast of the settlement; Pulo Anso, the northernmost, has a well of fresh water. 35

Pulo Karsik lies about 3 miles north-westward of Priaman, and half that distance off-shore; it is small, covered with trees, has a sandy beach, and is encircled by a reef to the distance of from one cable to 2 cables. 40

Pulo Anso, the northernmost island, is surrounded by a reef which extends about 1½ cables from its south-west side; it lies about one mile west-south-westward of Priaman.

General chart 2760.

Plan of Priaman road on 2760. Var. nil.

Pulo Tengah, the middle islet, is distant about three-quarters of a mile from Pulo Anso, with depths of $3\frac{3}{4}$ to 6 fathoms in the channel between; a reef surrounds it mostly on its western side.

- 5 Pulo Ujong, the southern islet, is surrounded by a reef and distant three-quarters of a mile from Pulo Tenga; each of these islands is about one cable in diameter.

Dangers.—The outer danger in the approach is Karang Durian, described with the outlying reefs, page 370.

- 10 **Karang Kayuputi**, 227° true, distant $2\frac{1}{2}$ miles from Pulo Karsik, has a depth of $2\frac{1}{2}$ fathoms, and often breaks.

Three reefs lie within a mile north-eastward of Karang Kayuputi; Kandu Pulu, with 2 fathoms, is the northern, Sipakal reef, the southern, and Kenali, the eastern, which has $1\frac{1}{2}$ fathoms least water.

- 15 **Karang Sepulu**, near the 5-fathoms contour fronting the settlement, has a depth of $4\frac{1}{2}$ fathoms, and is steep-to; it lies 5 cables, 301° true, from Pulo Anso.

Close to the shore near the mouth of Batang Priaman are two reefs always showing, and about half a mile north-west and south-east of these there are reefs which dry at low water and sometimes break.

- 20 Gusong Sibarat, which dries at low water, lies 3 cables south-west of Pulo Ujong with deep water between.

Priaman.—The town or village of Priaman is situated on the south point of a small river, the entrance to which is so shallow that

- 25 a boat cannot enter until near high water.
It was formerly a considerable centre. There are salt warehouses all over the settlement for supplying the Padang uplands. The smallness of the river is the cause of the export and import trade being much restricted. The Government representative acts as Harbour
30 master.

Communication.—The Netherlands Royal Packet Company's steamers running between Padang, Penang, and Singapore, call once a month. See pages 18, 19.

- A branch of the West Sumatra railway, from the main line through
35 Lubuk Alung, connects with Padang, the terminus. It is proposed to extend the line northward to Tiko.

Landing.—The best landing place is on the sandy beach south of the river mouth, approaching from between the two drying reefs which are always visible, near the shore.

- 40 *Chart 2760, Aceh head to Chingkuk bay.*

Landmarks.—North-eastward of Priaman are two hills: Gunong Tiga, 1,624 feet high, the northern, lies about 9 miles from the coast, when seen from the westward, is somewhat conical in shape and

General chart 2760.

Chart 2760, Aceh head to Chingluk bay. Var. nil.

having three tops, the southern being the lowest. See view of the high land about Priaman, on chart 709.

Gunong Sulasi (*Lat. $0^{\circ} 34' S.$, Long. $100^{\circ} 14' E.$*), the southern hill, is 650 feet high, situated 7 miles from the coast, and also conical shaped when seen from the westward. 5

On this coast, within Batang Arai entrance, is Gunong Chabadak, 1,597 feet high, with several ridges between it and Gunong Batu Mandi, 261 feet high, and 4 miles farther northward.

Batang Anai discharges in *lat. $0^{\circ} 48\frac{1}{2}' S.$, long. $100^{\circ} 17\frac{1}{2}' E.$* , 10 and southward of it is a sunken rock at a quarter of a mile off-shore. From thence to Padang, the shore bank, with depths under 3 fathoms, extends about 4 cables off. Abreast Pulo Sau the Air Dingin discharges, and at $2\frac{1}{2}$ miles nearer Padang, the Air Kurangi, 8 cables off which is a rock, is steep-to. 15

COAST.—The coast from Priaman to Padang, a distance of about 24 miles, is said to be free from dangers near the shore, but the chart is bare of soundings as far southward as the Batang Anai.

Pulo Sau (*Lat. $0^{\circ} 51' S.$, Long. $100^{\circ} 18' E.$*), situated 80° true, distant $5\frac{3}{4}$ miles from Pulo Air, at $1\frac{1}{2}$ miles off-shore; it is surrounded by a reef which projects about a quarter of a mile in places. 20

Reef.—A reef, dry at low water, lies 240° true, distant $1\frac{2}{10}$ miles, from Pulo Sau. It is not marked by surf.

Directions.—Approaching Priaman road from the northward along shore, bring Pulo Ujong lighthouse to bear 325° true; keeping it astern on that bearing will lead between Gosong reefs buoy and Sungi Bamban direct for Pulo Karsik off Priaman. Pass westward of that islet; from thence steer 161° true to pass westward of Karang Sepula, and thence between Pulo Anso and Pulo Tengah to the anchorage. 25 30

Or to pass outside the Batik reefs, bring Pulo Ujong to bear 357° true, astern, and keep it so for 9 miles, leaving Ingaris reef about $1\frac{1}{2}$ miles on the starboard, and Batik Kechil about the same distance on the port hand, and when Pulo Karsik bears 105° true, it may be steered for. 35

Vessels not entering Priaman road and bound to Padang or south-eastward, being about 4 miles south-westward of Priaman, may steer to pass about a mile eastward of Pulo Air, of the shoal south-eastward of it and of Karang Sipakal, there being no known danger inshore of this except the reef, lying rather more than a mile south-westward of Pulo Sau. 40

There is a channel on either side of Pulo Sau, but that to the westward is the best and most direct, care being taken to avoid the shoal already mentioned. When southward of that islet a direct course

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. nil.

may be steered for Padang head, or should unfavourable weather be apprehended, for the anchorage under Pulo Pisang, where vessels are sheltered from north-westerly winds; or for Emma haven within Pulo

5 Pisang, where there is complete shelter.

Chart 709, Ujong Masang to Ujong Indrapura.

PADANG.—See view of the high land of Padang, bearing south-east, on chart 709.

ISLANDS AND DANGERS in the northern approach.—Padang islands, seven in number, interspersed with numerous reefs, lie from 7 to 13 miles off Padang and the coast northward of it; they are all covered with cocoanut trees.

Pulo Bando (*Lat. $0^{\circ} 45' S.$, Long. $100^{\circ} 0' E.$*), the northernmost islet, is small and encircled by a reef which is steep-to; it lies 10½ miles south-west of Priaman, and 23 miles north-west of Padang.

Bajam reef.—Bajam and the other reefs northward of it are described on page 370.

Pulo Pie, overgrown with high trees, lies 9 miles, 145° true, from Pulo Bando; between them are a number of shoals, with depths 20 of 2 to 4 fathoms and deep water between, as charted; the shallower reefs sometimes break.

Stort reef (*Lat. $0^{\circ} 54' S.$, Long. $100^{\circ} 0' E.$*), about 5 cables in length in a north and south direction, has a least depth of $2\frac{1}{2}$ fathoms, with deep water around; it lies with Pulo Bando bearing 0° true, distant 9 miles; it generally shows by discoloured water.

Pulo Air (Ayer) or Lima is situated 91° true, distant $6\frac{1}{4}$ miles, from Pulo Pie.

Dangers.—A patch of 2 fathoms, steep-to, lies 281° true, distant 3 miles, from Pulo Air, and often breaks.

30 A patch of 3 feet, steep-to, lies 7 cables, 137° true, from Pulo Air.

Pulo Pandang or Ampox (*Lat. $0^{\circ} 57' S.$, Long. $100^{\circ} 8' E.$*) lies 153° true, distant 5 miles, from Pulo Pie. (*See Light, page 379.*)

Between Pulo Pie and Pulo Pandang there is an extensive reef with $1\frac{1}{2}$ fathoms least water, which sometimes breaks; at other times it is 35 marked by discolouration.

Pulo Sibuntar or Satu, the easternmost of the group, is small, high, flat, and distant 5 miles eastward of Pulo Pandang. There is a sand cay, occasionally covered at the highest tides, at half a mile eastward of it, and a patch of 3 fathoms at the same distance north- 40 eastward.

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Karang Sipakal has a depth of one fathom with 32 to 36 fathoms around, and seldom breaks; it lies with Pulo Sibuntar in line with Pulo Bindalang, the former being distant 2 miles.

Pulo Bindalang or Dua lies 2 miles south-west of Sibuntar, 5 having a safe passage between them.

A reef, with a depth of one fathom, which sometimes breaks, is situated 128° true, distant $2\frac{1}{2}$ miles from Pulo Bindalang.

Pulo Toran (*Lat. $1^{\circ} 2' S.$, Long. $100^{\circ} 10' E.$*), the southern and largest of the Padang group, lies 213° true, distant $3\frac{3}{4}$ miles from Pulo 10 Bindalang. At 3 miles 113° true from Pulo Toran is a patch of 3 fathoms, and at 80° true, distant $2\frac{3}{4}$ miles, a patch of $1\frac{1}{2}$ fathoms.

Dorothea reef, $1\frac{1}{4}$ miles in length in a north and south direction, has a depth of $3\frac{1}{4}$ fathoms over the north end, and 2 fathoms over the south end; the latter lies with Pulo Toran bearing 160° true, distant 15 $1\frac{3}{4}$ miles. A reef with $3\frac{1}{4}$ fathoms lies north-westward of Dorothea reef.

Bellona shoal, with a depth of 3 fathoms, is situated nearly 4 miles, 148° true, from Pulo Toran.

SOUTHERN APPROACH.—Pulo Niamuk or Mus- 20
kito (*Lat. $1^{\circ} 16' S.$, Long. $100^{\circ} 17' E.$*), situated about 18 miles southward of Apenberg head, and $6\frac{1}{2}$ miles westward from Ujong Teluk Lambu, is the outer islet in the approach to Padang from the southward. It is low, sandy, covered with cocoa-nut palms and with reefs extending a short distance from it. 25

LIGHT.—On Pulo Niamuk, from a white skeleton iron tower, 102 feet high, a light is exhibited at the same elevation. See view e on page 362.

Condor shoal, with a depth of $3\frac{1}{2}$ fathoms, is about one cable in extent, and lies with Pulo Niamuk light bearing 155° true, distant 30 $3\frac{1}{4}$ miles.

Pulo Laut lies 10 miles, 315° true, from Pulo Niamuk. It consists of 4 islets or rocks, of which the easternmost is overgrown, and has two sand patches, which dry, to the northward of it.

A reef, with a depth of 6 fathoms, lies with Pulo Laut bearing 35 281° true, distant $3\frac{1}{2}$ miles.

Pulo Marak, or Merak, at 4 miles north-eastward of Pulo Niamuk, and $1\frac{1}{4}$ miles off-shore, is $1\frac{1}{4}$ miles in extent, inhabited, and affords good water; near the south point is Pulo Sibuntar, a large rock covered with trees. See view of the island on chart 709, and view 40 f on page 378.

Anchorage.—Pulo Karang Ango, Pagang, Bintangor (view e on page 378), Sirongong, Sikowai, and Siranda are islets lying northward of Pulo Marak. There is anchorage in from 10 to 20 fathoms within all these islets, and shelter from N.W. and West winds. 45

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Karang Serinda, which breaks, is situated 279° true, distant 2 miles from Pulo Bintangor, with deep water between.

Pulo Siranda, or Seronda, is low, sandy, and overgrown with cocoanut palms; Pulo Sinjaru, or Senaro (*Lat. $1^{\circ} 7' S.$, Long. $100^{\circ} 20' E.$*), lying $3\frac{1}{2}$ miles north-west from it, is covered with boulders.

Gusong Siranda is a reef lying 128° true, distant $1\frac{1}{2}$ miles from Pulo Sinjaru.

A bank with a depth of $6\frac{1}{2}$ fathoms is situated 107° true, distant $2\frac{3}{4}$ miles from Pulo Sinjaru.

Gosong Gedang, a rock, above water, and surrounded by depths of 36 to 40 fathoms, is situated 300° true, distant $2\frac{1}{2}$ miles from Pulo Sinjaru.

Regentes, on which there is a depth of 6 feet, lies 47° true, distant $1\frac{1}{4}$ miles from Pulo Sinjaru. At one mile eastward of it is a patch of $2\frac{1}{4}$ fathoms.

The above are the principal dangers in the southern approach to Padang, but it is necessary to keep a careful look-out aloft when in the vicinity of any of these reefs, as others may exist. Between the last mentioned and Padang are others, included in Koninginne bay.

PADANG (*Lat. $0^{\circ} 57' S.$, Long. $100^{\circ} 21' E.$*) is the capital of the Governmental district of the west coast of Sumatra, and is the most important trade centre of the whole coast. It is situated on the north bank of the river, within Apenberg head.

The importance of its trade has been augmented during recent years by the opening up of the Umbilin coalfields. Emma haven, the port of Padang in Koninginne bay, is also an important place for the exploitation of the coal mines. Padang is considered as one of the finest places in the Netherlands East Indies, thanks to its open situation and the fine timber which everywhere surrounds it.

A range of mountains, which form a fine background, closes in the flat land of the town site from behind. The town, with its tall cocoa-nut trees and fine avenues, resembles a gigantic park, and leaves a general impression of being a large native settlement, amongst whose high trees and native dwellings occasional European dwellings have been built. These latter houses are generally built of wood or bamboo, and are raised on stakes a few feet above the ground. The Governor's residence is on the Belantong, the most coveted situation of the place, with the residence of the Military Commandant close by.

The population of Padang in 1905 was 47,000, of which 18,000 were Europeans and 5,000 Chinese.

Climate.—Padang is fairly healthy for a place on the coast; a fresh land breeze from the Barisan range of mountains blows in the

General charts 709, 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

morning and the evening, bringing with it an agreeable temperature ;
see page 20.

Communication.—The Netherlands Royal Packet Company's steamers from Batavia call fortnightly, and also those from Singapore, touching the coast at other ports. There is a regular service of steamers to and from Rotterdam. 5

Railway.—The railway owes its existence to the Umbilin coal-fields at Sawah Lunte. A branch line runs off at Lubuk Alung to Priaman, which was to be extended to Tiko. In addition, there is a branch line from Padang Panjang, at Fort de Kock, to Pajakombe. On the hilly portions of the track the line is laid as a funicular railway. In Padang there is a small branch line leading to the wharves at the mouth of the river, and there is a line to Emma haven. 10 15

Telegraph.—Padang is connected with other ports of Sumatra and with Batavia by telegraph, also by submarine cable with Anjol, near Batavia. (*See* Chapter I., page 18.)

Supplies.—Provisions of every description are obtainable at Padang, including cattle, poultry, fruit, and vegetables. Coal and drinking water at Emma haven, which is the port of Padang, *see* page 382. There are facilities for repairs to engines both at Padang and Emma haven. 20

There is a chart depôt at Padang.

Trade.—Padang is an open port. The principal exports are coffee, pepper, gutta-percha, coal, copra, rotan, damar, muscatels, nutmegs, mace, and cinnamon ; and the imports are tobacco, petroleum, rice, dried fish, linen, liquors, provisions, opium, cloth, and other dry goods. 25

Chart 212, Padang road and Koninginne bay. 30

Batang Arau or Padang river, is only navigable by craft under 6 feet draught in fine weather ; the depth at low water is about 7 feet off the Custom-house, decreasing above ; the spring rise of tide is about 3 feet. When the wind blows strong from West or N.W., the sea breaks entirely across the entrance and for some distance seaward, and all river traffic is suspended. It is navigable to just above the Chinese camp, and is used for the landing of goods, most of which, however, is now done at Emma haven. The right bank is built over with dwellings. From seaward the prison and the look-out stations on Apenberg are visible. 35 40

The praus of the Padang ferry service, which is also served by steam craft, carry goods, &c., to and from the trains on the right bank. The railway line leads along the river past the thickly popu-

General charts 709, 2760.

Chart 212, Padang road and Koninginne bay. Var. nil.

lated portions of the town, and the Military camp and hospital to the main station. There are suitable cranes and other appliances for loading and discharging on the river front.

5 **PADANG ROAD and KONINGINNE BAY.—**

Padang road.—The anchorage off Padang town, which is very exposed, and Padang road under Pulo Pisang, which affords fair shelter, is of little importance since Emma haven breakwater at the head of Koninginne bay was constructed, within which vessels of moderate draught may be loaded and discharged, and communication with Padang maintained without interruption by rail or road.

10 Padang road, on the other hand, is dependent on weather conditions; the operation of discharging or loading cargo is very difficult for the native lighters when a strong westerly or north-westerly wind gets up, as the entrance to the Batang Arau becomes dangerous for them on account of the breakers; all communication with the shore at such times ceases, and it takes as much as 2 hours rowing to cover the 2 miles to the roadstead.

20 Padang road affords depths of 5 to 6 fathoms over soft blue clay at about a cable distant from the east side of Pulo Pisang, with the extremes of the island bearing about 236° and 304° true; these depths extend over a breadth of about one cable.

Light draught vessels can proceed into Emma haven, northward of Pasir Gadang.

25 **Dangers.**—The dangers in the approaches, from both north and south, have been described in the preceding pages.

Apenberg head (*Lat. $0^{\circ} 58' S.$, Long. $100^{\circ} 20' E.$*), the south point of entrance to the Batang Arau, is a bluff headland, 355 feet high, thickly wooded and having a flagstaff on its summit. Batu 30 Mandi lies close westward of the head. In approaching from the offing, Apenberg head will easily be known by its bluff aspect, and the coast southward of it being bold high land; whereas the land near the sea to the northward of the river is low, and all the coast is low thence to Priaman, but far back from the coast the land is generally high. 35 *See Views of the land on chart 709, and view c on page 378.*

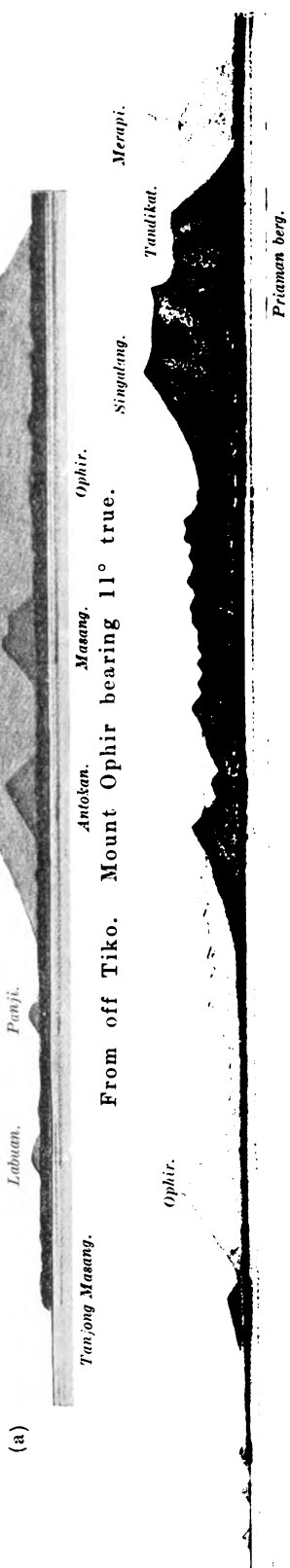
The bank, with less than 3 fathoms water, fronting the coast between Apenberg head and Ujong Jungut Batu Pati, the west extreme of Koninginne bay, extends about half a mile off these points, one mile from the shore of the bays between them, and to within 40 about 2 cables of Pulo Pisang.

Pulo Pisang, about $1\frac{1}{2}$ miles southward from Apenberg head, is hilly, 4 cables in length in a north and south direction and 3 cables in breadth, with two landing piers on its eastern side. A coral bank encircles the island to the distance of three-quarters of a cable in

General charts 709, 2760.

Views of coast Mountain ranges southward of Gunung Ophir.

(a)



(b)

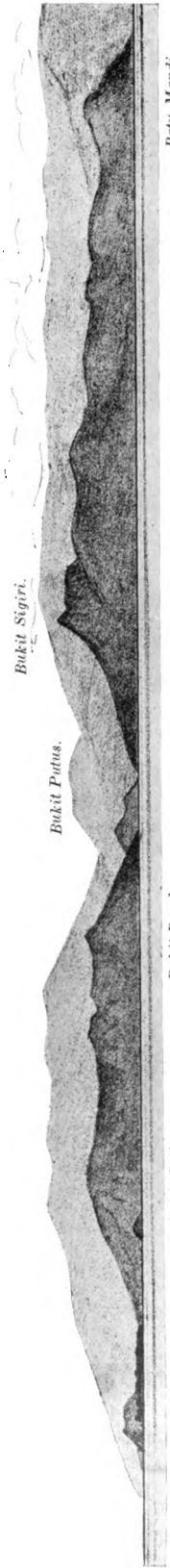
Barisan range, Priaman. Singalang mountain bearing N.E.
Tadang.

(c)



Off Padang. Apenberg bearing 85° true, distant 8 miles.

(d)



Bukit Putus bearing 45° true, distant 7 miles.

(e)



Batu Mandi (southward of Padang) bearing 18° true

Chart 212, Padang road and Koninginne bay. Var. nil.

places, with but little at its north and south extremes, steep to a short distance beyond. On its eastern side is Padang road, above mentioned. Light, *see* below.

Several small houses have been built for cases of infectious disease. 5

Beacon.—A white stone pillar and the light-support are situated on the hill at its south-west end of Pulo Pisang.

Pisang Ketek lies between Pulo Pisang and the shore, within the 3-fathom contour line and connected with the shore by a sunken rocky ridge. 10

LIGHTS.—**Pulo Pandang** (*Lat. $0^{\circ}57'S$, Long. $100^{\circ}8'E$*).—From a white iron tower, 190 feet in height, with a dwelling, a light is exhibited, at an elevation of 180 feet above high water.

Pulo Pisang.—On the south-west point of Pulo Pisang, from a white stone tower 39 feet in height, a light is exhibited at an elevation of 105 feet above high water. 15

Apenberg.—A light is exhibited, at an elevation of 16 feet above high water, from a white iron davit on a stone dwelling, situated on the north point of Apenberg.

Chart 709, and plan 212.

DIRECTIONS.—Padang is easily identified in clear weather, as it affords good landmarks to vessels approaching it. Gunong Ophir or Talaman, 9,558 feet high, lies near the equator and about 18 miles inland; Gunong Talang, 8,520 feet high, is situated in the western portion of the Padang highlands, about 18 miles within Apenberg head; it has 3 craters, one is extinct, another emits thick sulphurous fumes, and the last is filled with a burnt-up lava lake. Gunong Gadut, 6,099, and Gunong Gantang, 4,495 feet high, between it and the coast, Padang berg, 1,056 feet, on which there is a signal staff, near Apenberg, and Mount Pangilun, or Pangeleon, 308 feet high, northward of it, are also conspicuous objects, and the islets mentioned in the approaches should be all easily identified. 25 30

The white lighthouses on Pandang and Pisang islands are also conspicuous, and on a nearer approach the lighthouse and signal station on Ujong Sungi Bramei will be made out. 35

From the northward or westward.—Entering Padang road from the westward, which appears to be the best route, approach Pulo Pandang lighthouse bearing 90° true, to avoid Stort reef, thence passing close southward of Pulo Pandang, steer between Pulo Sibuntar and Pulo Bindalang to the anchorage under Pulo Pisang; or proceed for Emma haven, where there is more sheltered anchorage. 40

Sailing vessels should approach according to the prevailing wind. Tugs are available for taking vessels into Emma haven.

General chart 2760.

Chart 709, and plan 212. Var. nil.

The south entrance is preferable for steam vessels in proceeding to the anchorage under Pulo Pisang, passing south of that island at about a quarter of a mile distant, and then steering for a berth off the south pier, where there is shelter from west and north-west winds; page 378.

From the southward.—Approaching Padang from the southward, with a favourable wind, a sailing vessel should make Pulo Niamuk, a low islet with trees from 30 to 50 feet high, and a light-structure. The island should not be brought to bear westward of 343° true, nor approached within one mile, as reefs extend about half a mile from it. Having passed Pulo Niamuk at about one mile distant, on either side, course should be shaped to pass the same distance west of Pulo Marak, and at about half a mile westward of Pulo Bintangor and Pulo Siranda to avoid Serinda shoal.

There is also a narrow and safe passage eastward of Pulo Bintangor and Pulo Siranda, with depths of 20 to 30 fathoms, and which is generally considered the best.

Having passed Pulo Siranda by either channel, it should then be brought to bear 183° true, astern, steering an opposite course for Pulo Pisang lighthouse, which course will lead eastward of a 6-fathoms patch and another of 2½ fathoms lying 2 miles north-eastward of Pulo Sinjaru and westward of Marlboro' shoal to Padang road, the anchorage within Pulo Pisang.

If bound to Emma haven, a course direct for the pier head may be steered with the whole of Pulo Merak well open eastward of Pulo Siranda, astern, bearing 193° true, which leads between Marlboro' shoal and Ujong Sungai Bramei, and westward of the white buoy on the eastern side of the fairway.

Tides.—In Emma haven there is a self-registering tide gauge. It is high water, full and change, at VIh. 50m.; springs rise 3½ feet, neaps 2½ feet; neaps range one foot. For movement of the tides, see pages 366, 367.

Tidal streams.—In Padang road the flood sets to the north-west and ebb to the south-east at a rate of not more than one knot an hour.

Climate.—Padang is generally considered healthy. There are no regular wet and dry seasons; rain most frequently falls during the night, but sometimes it rains for two or three days in succession. (See also pages 19, 20.)

Plan of Koninginne bay, &c., 2 2.

KONINGINNE BAY and EMMA HAVEN.—Koninginne bay is situated about 3 miles southward of Padang, eastward of Padang roadstead. At its head is Emma haven, protected by a break-water, extending for a distance of half a mile in a south-east direc-

Plan of Koninginne bay, &c., 212. Var. nil.

tion, from the western shore, and enclosing a space about half a mile square, with a depth of $4\frac{1}{4}$ to $4\frac{3}{4}$ fathoms.

On Karsik shoal, which occupies the centre of the harbour, a breakwater, 300 yards in length, built parallel to, and distant about 500 yards from the main wharves, shelters the space within from all winds; but that portion of the bay eastward of the breakwater is open to southerly winds.

Aspect.—Koninginne bay, formerly known as Brandywine bay, is bounded by steep overgrown banks. Northward of Ujong Sungi Bramei, conspicuous by a lighthouse-keeper's house and signal staff, a high ridge of hills forms the eastern shore of the bay, with Bukit Tapat and the villages of Sungi Baramas, Telok Nibung, and Telok Bajur near the coast. When the bay opens up, Emma haven will appear on a background entirely closed in by a high overgrown ridge of hills. *See view d* on page 378.

Dangers in the approach.—The following shoals lie on the western side of the southern approach to Koninginne bay:—

Marlboro' shoal, about one cable in diameter, with a depth of about 4 feet, is steep-to; it lies with Sungi Bramei lighthouse bearing 101° true, distant $1\frac{1}{2}$ miles, and is marked by a lighthouse.

Light.—From a black iron framework structure erected on the south edge of Marlboro' shoal a light is exhibited, at an elevation of 36 feet. *See Light list.*

Pasir Gadang is a reef about $2\frac{1}{2}$ cables in length and $1\frac{1}{2}$ cables in breadth, situated about one mile north-eastward of Marlboro' shoal lighthouse. On its eastern side is a sand-cay about a cable in length, on which cocoanut trees have been planted.

Patches of $1\frac{1}{4}$ and one fathom, steep-to, lie between it and Marlboro' shoal, as charted, and others between Pasir Gadang and Ujung Jungut Batu Pati, northward of it.

Buoy.—On the eastern side the only danger is a patch of 4 fathoms, with depths of 7 to 8 fathoms around, situated with Ujong Sungi Bramei lighthouse bearing 179° true, distant $1\frac{1}{2}$ miles; it is marked by a white buoy.

LIGHT.—From a white iron framework, 47 feet high, erected on Ujong Sungi Bramei, a light is exhibited, at an elevation of 548 feet above high water. *See Light list.*

Signal station.—There is a signal flagstaff near the lighthouse, on Ujong Sungi Bramei, where a lookout is kept night and day on all vessels, including those in Padang road. The Harbour master is then informed whether a pilot is wanted or the vessel has hoisted the quarantine flag, &c.

General chart 2760.

Plan of Koninginne bay, &c., 212. Var. nil.

Coal.—Wharves.—Vessels which cannot lie alongside the wharves are coaled at the buoys by lighters, which hold from 100 to 140 tons. There are warehouses and three wharves, each about 280 feet
5 in length, one of 180 feet in length, and a shorter one where the colliers load, fitted with hoists; there is a low-water depth of 26 feet alongside, but vessels of 25 feet draught cannot lie alongside at low water; only 4 vessels can be berthed at one time. The railway trucks run on to the wharves. There is a short wharf on the breakwater for craft
10 carrying explosives. Vessels cannot lie alongside each other, as there is generally too much swell. Vessels with petroleum are not permitted to enter the harbour, and have to discharge at Pulo Pisang.

The railway is connected to the Umbilin coal fields in the interior, and with the warehouses at Padang; these mines belong to the Crown.
15 About 280,000 tons are exported annually, and some 30,000 tons are usually in stock. There are 10 lighters available for such vessels as cannot enter the Haven, or cannot find room at the wharves. Vessels of about 24 feet draught can coal alongside. 200 tons can be put on board in an ordinary day's work. There is a coal wharf
20 with a transporter.

Two steam cranes having a lifting power of from 3 to 4 tons, and hydraulic cranes are also available for loading and discharging cargo.

Communication, supplies, &c.—*See* Padang, page 377.

Water is laid on to each end of the wharves, and supplied free
25 of charge to vessels of war from two hydrants, at the rate of 12 tons per hour for each hydrant; water is also laid on to the coal wharf.

Light.—A light is shown from a white iron davit on the pier head, at an elevation of 19 feet above high water.

Light-buoys.—A white buoy is moored off the south-west end
30 of the breakwater on Karsik shoal, exhibiting a *green fixed* light.

A black buoy is moored off the north-east end of the breakwater on Karsik shoal, showing a *red fixed* light.

Two white buoys, moored 71° true and 20° true, each distant about 4 cables from the breakwater light, exhibit a *green fixed* light.

Buoy.—Off the toe of the breakwater, there is a black
35 can buoy.

There are several mooring buoys in the haven.

Tugs.—There is a tug for the harbour service, and the Padang ferry service provides tugs or a steamer, which run fairly regularly
40 between Padang and Trusan bay.

Pilots.—Signals.—Pilots are stationed at Emma haven, and by day the pilot boats fly a blue flag, with letter E in white on it. At

General chart 2760.

Plan of Koninginne bay, &c., 212. Var. nil.

night the steam pilot boat carries a red light above her ordinary white light ; the sailing pilot boat carries a red light only.

The signal for a pilot is the ordinary pilot flag (the national flag surrounded by a white border), the national flag at the foremost head, or the signal P.T. of the International code. By night the pilot signal is an ordinary blue light. 5

The Harbour master is the superintendent of the pilots who hold certificates. A fine is made on vessels engaging a pilot and not taking him at the stated time. 10

Native licensed pilots for the west coast of Sumatra are obtainable at Padang and Emma haven.

Quarantine.—The usual regulations for vessels from infectious ports, and for the control of the harbour, are in force in all Netherlands Indian harbours. 15

DIRECTIONS.—The directions for Padang road from the southward, page 379, apply also to Koninginne bay and Emma haven. Vessels are forbidden to enter Emma haven at a greater speed than 5 knots.

Vessels above 24½ feet draught can only enter the haven by permission of the Harbour master. 20

From between Marlboro' shoal lighthouse, and that on Tanjong Sungi Bramei, the course is direct for the entrance to Emma haven, between Pasir Gadang and the white buoy marking the 4-fathoms shoal on the eastern side, anchoring near the buoy in 6 to 8 fathoms if not entering Emma haven. The turning around either end of Karsik shoal is somewhat sharp, and requires slow speed and great care, stopping if necessary. 25

By night.—Coming from the northward, having made Pulo Pandang light, steer for it bearing about 90° true, or on such a bearing as to clear the outlying shoals, and, passing about half a mile southward of it, steer 100° true, passing between Pulo Bindalang and Pulo Sibuntar for Pulo Pisang light. When at about 2 miles from it steer to pass westward of Marlboro' shoal light, and with Ujong Sungi Bramei light, bearing about 85° true, steer for it, which should lead about 4 cables southward of Marlboro' shoal light. 30 35

A vessel of too deep draught to enter Emma haven, should bring Marlboro' light astern, bearing 230° true, and anchor before the pier light bears westward of 333° true, in about 5½ fathoms.

If bound into Emma haven, steer for the light on the end of the pier bearing 16° true, in depths of not less than 4 fathoms, passing about a cable eastward of it to the harbour. 40

General chart 2760.

Plan of Koninginne bay, &c., 212. Var. nil.

A vessel desirous of entering Emma haven after sunset must report this by signal to the lighthouse keeper on Ujong Sungi Bramei, who will telegraph to the Harbour master, and as soon as a satisfactory answer
5 is received, he sends up a rocket as a signal that the pilot will come off and bring the vessel in.

General chart 2760.

CHAPTER VIII.

FROM SOUTHWARD OF KONINGINNE BAY TO FLAT POINT,
ENTRANCE TO SUNDA STRAIT.

VARIATION (westerly) increasing 2 minutes annually.

Chart 709, Ujong Masang to Ujong Indrapura.

COAST.—From Padang to the distance of 30 miles southward the coast is intersected by numerous bays and inlets, several of which, being protected from the sea by the islands contiguous to them, form excellent harbours. The land near the sea is generally of moderate height and, farther in the country, more elevated. 5

Aspect.—The sand-flat along the coast is everywhere narrow and in some places ceases altogether; this is particularly the case southward of Padang and near Chingkuk bay, where the mountains come close to the coast and give it a wild and desolate appearance. 10

Between Indrapura and Moko Moko an alluvial plain separates the mountains from the sea, and renders the western portion of the Indrapura district low and marshy, with a less healthy climate. The Benkulen district also consists largely of flat land, or of undulating expanses, which rarely rise above 300 feet in height. 15

These mountains are spurs of the main mountain ridge of Sumatra and form valleys, down whose western slopes run the streams which flow into the sea along the coast. The main chain is the Barisan or Bukit Barisan, and chiefly consists of the ranges which traverse the whole length of Sumatra. In the portion now being dealt with the mountain range rises at a distance of 15 to 30 miles from the coast, gradually decreasing in height until it descends to the low westernmost isthmus of the south coast of Sumatra. 20

The whole range is mainly volcanic in character, and is joined to a submerged chain whose peaks form the islands lying at distances of 45 to 70 miles to the west of Sumatra, namely, the Banjak, Batu, Mentawi islands, &c. Numerous volcanoes exist, the peaks of which often emit smoke, and are seen rising above the other portions of the chain. 25

Gunong Korintji or Indrapura peak, 12,484 feet high (*Lat.* $1^{\circ}47' S.$, *Long.* $101^{\circ} 15' E.$), is the highest in Sumatra. According to the leaders of the Sumatra expedition in 1877-1878, there are no actual craters but several fissures and holes, out of which the steam is driven with terrific force. View *b* on page 392. 30

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Anchorage.—Between Ujong Indrapura and Flat cape, at the entrance to Sunda strait, there are no ports or anchorages that are safe during the westerly monsoon period.

- 5 **Landing** is always dangerous on account of the heavy surf.

Plan of Bunga bay on 866.

BUNGA or BUNGUS BAY, in which there are several villages, is separated from Koninginne bay by Ujong Sungi Bramei, on which is a lighthouse and signal staff, before described.

- 10 It is a safe anchorage, with depths of from 14 to 15 fathoms in the entrance, and from 7 to 10 fathoms farther in. Pulo Kassie, a small islet, lies near the middle of the northern arm of the bay.

A shoal is situated about 2 cables, 11° true, from it.

- 15 **A shoal** with two shallow heads, 150 yards in length, north and south, lies with its northern extreme 176° true, distant $5\frac{1}{10}$ cables from Pulo Kassie.

- A rock, which dries, lies in the entrance to Pandan bay, south side of Bunga bay, at a distance of $1\frac{4}{10}$ cables, 75° true, from Tanjong Pandan. The shores of the bay are foul to the distance of a cable in places.

- 20 The directions for approaching Padang from the southward (page 383) apply here also. When in the entrance, borrow towards the northern side to avoid the shoals off Pulo Kassie or Karsik, and anchor between it and the island, or nearer to the head, where there is good shelter. Shallow water extends off the point and island that form the north-east side of this anchorage. There are several villages in Bunga bay.

- Anchorage.**—The anchorage in the northern part, known as Bungus bay, is in 9 fathoms, over mud, with Pulo Kassie or Karsik bearing 251° true, and the island, near the shore off Ujong Gunung Gunung, 166° true. Southward of Ujong Gunung Gunung there is anchorage in from 10 to 12 fathoms water, open to westerly winds.

Chart 709, Ujong Masang to Ujong Indrapura.

- 35 **COAST.**—**Sungi Pisang bay**, lying close southward of Bunga bay, is about one mile across, and open to westerly winds. Two rocks lie in the entrance, with depths of $1\frac{1}{2}$ and 2 fathoms over them; abreast the rocks, close to the northern shore, there is a narrow passage with depths of 15 to 17 fathoms, decreasing inside to 8 and 9 fathoms; there is also a narrow passage between Pulo Sikowai off its entrance, and the southern point of the bay.

Sungi Pinang bay lies southward of Sungi Pisang bay, and is free from outlying dangers. In this bay vessels are sheltered from

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

almost every wind by Pulo Marak, and it is only open to S.S.W.; anchorage may be found in 25 fathoms, mud bottom, in the north-west part of the bay, south-westward of the rocks.

Plan of Tarusan bay on 1701.

TARUSAN BAY (*Lat. 1° 13' S., Long. 100° 25' E.*), fronted by Pulo Chubadak, is about 5 miles in extent, and safe, with general depths of from 8 to 16 fathoms, over soft blue clay. Tarusan village, lying in the south-east part of the bay, is a place with some trade. There are two passages into the bay, on either side of Pulo Chubadak.

In entering by South Njala strait, the northern channel, which is about one-third of a mile wide, the northern shore must be kept, to avoid a reef with 2 fathoms, lying about 3 cables south-west from the north-west point of Pulo Chubadak. The north-east point of Pulo Chubadak open of the north-west point, bearing about 90° true, leads northward of this shoal. Within the entrance the channel is deep and safe.

In Seronjong strait, the southern entrance, there are three islands, of which Pulo Seronjong Gedang, the largest, lies in the middle; Pulo Nibung and Pulo Seronjong Kachik, the others are on the north side, connected to Pulo Chubadak by reefs. There is a channel about 1½ cables wide between Pulo Seronjong Gedang and the northern islets, with depths of from 10 to 20 fathoms, but soundings are scarce here. The channel southward of the island is recommended. See view *a* on page 32.

Pulo Setan Kechil, or Pasir Panjang, in the middle of Tarusan bay, is 177 feet high, and surrounded by a reef, with overgrown rocks on it; a line of small reefs extends north-eastward from it to the head of the bay. Northward of Tarusan village there is a watering-place.

Chart 709, Ujong Masang to Ujong Indrapura.

DANGERS off-shore.—Ujong Teluk Lambu, the extreme of a prominent peninsula partly forming Tarusan bay, lies about 2½ miles southward of the entrance to that bay: and fronting the long bay between it and Ujong Raja, 24 miles further southward, are the following islets and dangers:—

Pulo Aur Gedang or Ayer Besar (*Lat. 1° 23' S., Long. 100° 29' E.*), the largest of the islets, about a mile in length in a north and south direction, lies about 8½ miles south-south-eastward of Ujong Teluk Lambu, and has a conspicuous round hill, 443 feet high, on its south side; close to the southward of it is Pulo Aur Kachik or Ayer Kechil, connected by a reef on which lie some small islets, with the larger island. Both are inhabited.

Pulo Kumbang and Pulo Babi lie nearly midway between these islands and the mainland to the northward, and Pulo Sermangki, a group of rocks, lies between them and Chingkuk bay.

General chart 2760.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Pulo Panyu, the outer islet, lies 6 miles south-westward of Aur Kachik, and 8 miles off-shore. All these islands have deep water within a short distance.

5 **Supplies.**—Poultry and water may be procured at Pulo Babi.

Gebua Namaja, with a depth of $1\frac{3}{4}$ fathoms, and which sometimes breaks, lies with the round hill on Pulo Aur Gedang bearing 101° true, distant $5\frac{1}{2}$ miles.

10 **Gebua Dingin**, about $2\frac{1}{2}$ miles, 300° true, from Gebua Namaja, has a depth of 3 fathoms, and lies with the hill on Pulo Aur Gedang bearing 107° true.

Erasmus reef, formed of coral and with a depth of 3 fathoms, lies with Pulo Panyu bearing 157° true, distant $2\frac{1}{4}$ miles.

15 **Van Speik reef**, of coral, with a depth of 2 fathoms, is about 2 cables in extent, and lies 70° true, distant $2\frac{3}{4}$ miles, from Pulo Panyu.

NOTE.—These reefs being steep-to should be given a wide berth, vessels passing well to westward of a line joining Pulo Niamuk and Pulo Panyu.

20 **CHINGKUK or TYINGKOK BAY** lies about 11 miles south-eastward of Ujong Teluk Lambu, and is the northernmost of four bays in the extensive bight formed between Ujong Baton and Ujong Telok Kersik.

25 **Anchorage** (*Lat. $1^\circ 20' S.$, Long. $100^\circ 34' E.$*).—The bay has regular depths and good anchorage near Salido village, in depths of 4 to 6 fathoms, at its north-west part.

30 **Directions.**—Approaching Chingkuk bay from the northward, vessels may pass on either side of Pulo Niamuk, thence steering for Pulo Kumbang to avoid the shoals south-eastward of Pulo Niamuk. Between Pulo Kumbang and Pulo Aur Gedang the depths are from 16 to 25 fathoms, and from between these islands, steer to pass southward of the Sermangki group, and thence into the bay.

35 **Painan bay** lies south-eastward of Pulo Chingkuk, with depths of from 7 to 10 fathoms in the fairway southward of the island, and from 4 to 7 fathoms in the bay. Painan is a place of some trade, and has a wharf for the convenience of loading and discharging goods.

Anchorage may be obtained in 8 fathoms, good holding ground; small craft can go nearer to the north-east corner of the bay, in from 5 to 3 fathoms, off the village, where there is better shelter from north-west winds.

40 Good drinking water, fowls, fruit, and cocoanuts are obtainable in small quantities.

Directions for Chingkuk bay, above, apply to Painan.

General charts 2760, 2761.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

Batung or Batuwang bay lies southward of Chingkuk bay, and affords good anchorage in moderate depths, open to westerly winds. Batu Dandang, a reef with rocks above water, extends off the north point of the bay. 5

Sungi Bungin bay, or Telok Kersik, is similar to Batung bay. Near its north point is Pulo Nago. Ujong Batu Barjujut is a prominent point forming the south-west extreme of Telok Kersik.

Batang Kapas bay lies 5 miles south-east of the point; it affords good anchorage in 7 to 10 fathoms, but is open to westerly winds. 10

Ujong Raja, at $6\frac{1}{2}$ miles southward of Ujong Batu Pandan, the south extreme of Batang Kapas bay, has a hill, 477 feet high, immediately over it, with Batu Mandamai, 262 feet high, over the coast at one mile southward of it. 15

Padangut reef always breaks and lies three-quarters of a mile off-shore at about one mile southward of Ujong Batu Pandan, and Pulo Karsik at about half a mile off Batang Si Ranti, $2\frac{1}{2}$ miles farther southward.

OFF-LYING ISLETS AND DANGERS.—The islets and reefs lying between Pulo Panyu (*Lat. $1^{\circ} 30' S.$*) and Ujong Indrapura, some 45 miles to the southward, and from 5 to 15 miles off the coast, will now be described. They are all steep-to. 20

Pulo Karaba Kechil (*Lat. $1^{\circ} 36' S.$, Long. $100^{\circ} 33' E.$*) lies $9\frac{1}{2}$ miles south-eastward of Pulo Panyu, and 5 miles from Ujong Raja. 25

Gebua Tenga, with a depth of $2\frac{1}{2}$ fathoms, and steep-to, lies with Pulo Karaba Kechil bearing 111° true, distant $4\frac{1}{2}$ miles. Gebua Batang Kapas, a bank with a depth of 12 fathoms, is situated 197° true, distant $1\frac{1}{2}$ miles from this reef.

Pulo Karaba Besar lies $4\frac{1}{2}$ miles, 218° true, from Pulo Karaba Kechil. A patch of 6 fathoms lies 306° true, distant $1\frac{3}{4}$ miles from Pulo Karaba Besar. 30

Pulo Gosong, or Kersik, lies about 6 miles, 125° true, from Pulo Karaba Besar.

Gosong Nambi, which dries at low water, lies 254° true, distant $4\frac{1}{2}$ miles from Pulo Gosong. 35

Gebua Kechil, with a depth of $2\frac{1}{2}$ fathoms, is situated 216° true, distant $3\frac{1}{2}$ miles from Pulo Gosong, and Gebua Brankai, with $2\frac{1}{4}$ fathoms, lies about one mile further in the same direction.

Gebua Lawas, on which the depth is 2 fathoms, is small and lies 188° true, distant $5\frac{1}{4}$ miles from Pulo Gosong. 40

General charts 2760, 2761.

Chart 709, *Ujong Masang to Ujong Indrapura*. Var. nil.

Pulo Katang Katang lies 10 miles southward from Pulo Gosong, and is $13\frac{1}{2}$ miles off-shore.

LIGHT (Lat. $1^{\circ} 53' S.$, Long. $100^{\circ} 34' E.$).—From a white iron framework, 65 feet in height, erected on the centre of Pulo Katang Katang, a light is exhibited, at an elevation of 65 feet above high water. See Light list.

Pulo Baringin, the southernmost of the chain of islands in this locality, lies 4 miles, 108° true, from Pulo Katang Katang and 10 miles from the shore.

A reef, with a depth of $2\frac{1}{2}$ fathoms, lies 322° true, distant $1\frac{7}{10}$ miles from Pulo Baringin.

A patch of 5 fathoms is situated 193° true, distant $1\frac{1}{4}$ miles, and another, with 4 fathoms, 178° true, distant 4 miles from the same island.

Gebua Gadang (Lat. $1^{\circ} 47' S.$, Long. $100^{\circ} 44' E.$), a reef with one fathom water over it, lies one mile off-shore north-westward of Kampong Palangai Lama; about one mile northward of it there is a rock of $1\frac{1}{2}$ fathoms.

Gebua Pudong, a reef with $1\frac{1}{2}$ fathoms, lies $2\frac{1}{2}$ miles, 158° true, from Gebua Gadang, and one mile from the coast.

Gebua Sumedang, a reef that dries, lies $1\frac{1}{2}$ miles off the coast, with Gunong Lenggok or Linga, bearing 102° true, distant $7\frac{1}{2}$ miles.

Southward and westward of this danger are three rocks, with depths of $1\frac{3}{4}$ to $2\frac{1}{2}$ fathoms, and 12° true, distant one mile, there is a rock with $2\frac{1}{2}$ fathoms, at about 8 cables off the mouth off the Air Sumedang.

Coast.—Between Ujong Raja and Ujong Indrapura, 35 miles to the southward, the coast forms a bight in which the Batang Air Indrapura and some minor streams discharge.

For a distance of 5 miles or more off-shore there are no known dangers except those in Gebua Gadang and others that have been mentioned off and near the mouth of the Batang Air Lama, extending parallel to the shore for a distance of about 5 miles at about one mile off.

The Batang Air Kambang, Batang Air Lakitan, the Batang Air Palangai, Batang Air Pungasan, Batang Air Haji, and the Air Bantaian discharge between Ujong Raja and the mouth of the Indrapura; they are of no importance to navigation, the entrances being nearly always breaking. There are villages at or within their mouths, as charted.

Batang Air Indrapura, the most important stream southward of Padang, is situated about 10 miles northward of the point of

General charts 2760, 2761.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

same name. There is generally a heavy surf at the entrance, but small native craft can enter during the greater part of the year except at low water. It takes a very tortuous course to the town of Indrapura, and has its rise near Mount Rasa.

Small vessels can anchor in 4 fathoms westward of its mouth with Gunong Lenggok bearing 17° true. Large vessels should not come under 8 fathoms, or within 2 miles of the shore. Vessels, however, should only anchor off this exposed coast in case of necessity, as it is unsafe during westerly winds.

Anchorage.—Batang Air Haji (*Lat. $1^{\circ}52'$ S., Long. $100^{\circ}53\frac{1}{2}'$ E.*) may be known by Mount Lenggok or Linga, the remarkable sugar-loaf hill, 1,297 feet high, covered with trees and near the sea, about 5 miles north-north-eastward of the entrance, which is not easily made out.

There is temporary anchorage in not less than 8 fathoms, about 2 miles off-shore, with the flagstaff bearing 90° true. If north-westerly winds are apprehended, a sailing vessel should anchor in a depth of 12 or 13 fathoms in order to clear Ujong Indrapura, should she be unable to remain, as this anchorage, which is little visited, is not considered safe with those winds.

The bar of the river is dangerous for boats at low water, and at all times when there is a swell. The village is 2 miles up the river.

Pungasan village is situated about a mile up the river of the same name, at about 4 miles northward of the Air Haji.

Anchorage may be obtained off Indrapura river, in 4 fathoms water, with the south point of the river mouth bearing E. $\frac{1}{4}$ N.

Ujong Indrapura (Tanjong), 14 miles southward of Batang Air Haji, is low and its extremity covered with trees; it is steep-to, having a depth of 10 fathoms close to it. From hence to Benkulen there are no islands near the coast.

COAST.—Aspect.—Directions.—Proceeding southward from abreast Ujong Raja it will be prudent, if coasting along, to keep 4 or 5 miles off-shore, to avoid Gebua Sumedang and other reefs near the shore northward of it.

Gunong Batutiga or Lakitan, 853 feet, and Gunong Sugirik, 820 feet high, about 2 miles within Ujong Raja; Gunong Jalamu or Lakitan hill, 343 feet high, 8 miles to the south-eastward, and Gunong Lenggok, 11 miles farther in that direction, near the coast, as well as Gunong Baringit, 4,452 feet, and Gunong Pandan Gadang, 4,550 feet high, with others of less height, some of which have been mentioned, back the coast some 10 miles inland in about lat. $1^{\circ}45'$ S., will be of much assistance in fixing the position of a vessel when navigating in this locality. At about 27 miles inland are the high peaks

General charts 2760, 2761.

Chart 709, Ujong Masang to Ujong Indrapura. Var. nil.

of Gunong Korintji, 12,678 feet high, and Patah Sambilan, 9 miles west-north-west of it (chart 2,761). There appears to be no danger inshore between Gebua Sumedang and Ujong Indrapura other than the shelving shore bank in the bight northward of that point.

Southward of Ujong Indrapura, in a sailing vessel bound to Benkulen, if the wind be steady, a direct course may be steered along the coast, keeping from 6 to 15 miles off; but with light winds it will be proper to preserve moderate depths, from 15 to 25 fathoms for anchoring, if requisite; never exceeding 30 fathoms, nor borrowing under 10 fathoms towards the shore, in case of getting into foul ground.

In the day time, with a good look-out aloft, most of the dangers will be visible; at night, a vessel should keep well outside all the islets.

15 *Chart 2761, Chingkuk bay to Strait of Sunda.*

Moko Moko (Lat. $2^{\circ} 37' S.$, Long. $101^{\circ} 7' E.$) lies in a long bight, whose northern portion is overgrown with casuarina trees as far as the settlement; it was once a British settlement, and is the only port in Benkulen residency from which rice is exported. The Sungi Slagan runs along within the beach, and discharges just to the south of Sungi Menjutu, near the town. The mouth of the latter is conspicuous from the anchorage on account of the trees being considerably lower at its entrance. On the south point of the port there are some fairly high trees. Coming from the northward the high trees on the high point of Plokang bay (not charted) form the second easily distinguishable mark after Ujong Indrapura, 32 miles to the northward. See view c abreast.

A reef, from one to $1\frac{1}{2}$ miles broad, fronts the coast for 9 miles southward from Moko Moko.

30 **Communication.**—Moko Moko is connected with the telegraph system of Sumatra.

Sarang Alang reef, about 4 cables in length, and one cable in breadth, has a depth of 3 fathoms, from 20 to 40 fathoms around, and lies 275° true, distant 8 miles from Moko Moko: with a heavy swell the sea breaks on it.

A shoal, the existence of which is doubtful, is charted about 3 miles northward of Sarang Alang reef.

A shoal with but little water is charted 7 miles southward of Sarang Alang reef.

40 **Anchorage** may be obtained in 10 fathoms water, over soft ground, with the flagstaff bearing 80° true, distant $2\frac{1}{2}$ to 3 miles, and Moko Moko peak, which is remarkable, 41° true. Small vessels may anchor nearer the shore in a depth of about 5 fathoms.

General charts 2761, 2760.

Views of Mountain ranges between Tarusan bay and Benkulen.



(a)



(b)

Seronlang Kachit
bearing 22° true.

Tarusan bay, southern approach.

Off Benkulen.

Bunkuk or Sugarloaf bearing 37° true.

Indrapura.

Raja.

Bantal.



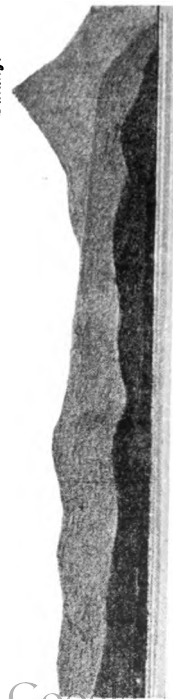
(c)

28° true.

From about 13 miles off Moko Moko.

Moko Moko,
86° true.

Talang.



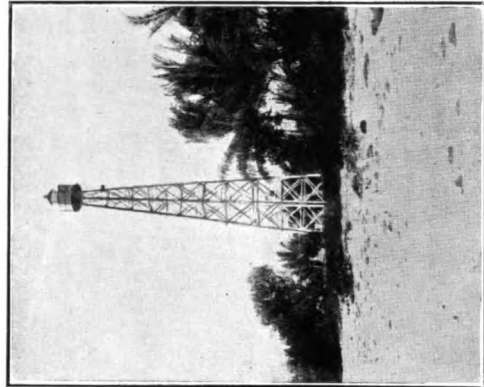
(d)

South-westward of Ujong Indrapura.
Gunong Talang bearing 67° true.



(e)

Gunong Korintji
or Indrapura peak
bearing 54° true.



(f)

Pulo Tikus lighthouse,
off Benkulen.

Chart 2761, Chingkok bay to Strait of Sunda. Var. nil.

The native boats must be employed in landing, on account of the surf. The coast in the neighbourhood is a sandy beach on to which a heavy swell is generally setting, as is usually the case on this coast south of the equator. 5

Coast.—The coast to the southward of Moko Moko, for a distance of 9 miles, is fringed by a reef which extends from one mile to about $1\frac{1}{2}$ miles off-shore.

Aspect.—Within Moko Moko, from about 20 to 40 miles, is the continuation of the range of mountains extending southward from Gunong Korintji. Gunong Talang, 4,518 feet in height, lies within Ujong Indrapura, in about lat. $2^{\circ} 8' S.$ See views *b*, *c*, and *d* on page 392. 10

Farther southward is Gunong Raja, 7,550 feet, Gunong Bantal, 5,906 feet, Gunong Pandan, 9,183 feet, and Gunong Seblat, 6,565 feet, southward of which is the end of the range known as the Ambong Brass Gebergie. 15

Nearer the sea lies Gunong Lumut, 7,097 feet, Gunong Palik, 8,200 feet, and Gunong Kaba, 6,497 feet high, at 27 miles north-eastward of Benkulen. 20

Ayer Dikit, about 10 miles southward of Moko Moko, and a little southward of a bluff point covered with trees, may be recognised by the denseness of the trees on each side of the mouth of the river. The bar of the river is dangerous and unnavigable, even for boats. 25

There is anchorage off the river mouth in depths of from 8 to 10 fathoms. 25

Ayer Bantal (Lat. $2^{\circ} 45' S.$, Long. $101^{\circ} 18' E.$), 7 miles south-eastward of Ayer Dikit, may be known by two white rocks a little to the northward of it; the village lies 5 miles northward of the entrance.

The best anchorage in the road is in depths of from 8 to 9 fathoms, over ooze and sandy bottom, with the white rocks bearing 24° true, and the river entrance 45° true. 30

Coast.—Between Bantal and Ipu, 20 miles to the southward, are three rivers or streams, the Tramang, Ayer Hitam, and the Retak; Tramang, the northernmost, has a small red cliff on the north side of the entrance; the coast, embracing those rivers, may be approached to depths of about 12 fathoms, regular depths, in most places. 35

Ipu village (Lat. $3^{\circ} 1' S.$, Long. $101^{\circ} 28' E.$), 5 miles south-eastward of Sungi Retak, may be known by three red cliffs to the southward, and three green hills near the sea. 40

Large vessels may anchor in depths of 9 or 10 fathoms, with the central cliff bearing 57° true; here the roadstead is tolerably clear, whilst farther in the bottom is foul.

Swallowfield rock, with a depth of $2\frac{1}{4}$ fathoms, and from 8 to 16 fathoms around, lies 238° true, distant $3\frac{1}{2}$ miles from Ipu. 45

General chart 2761.

Chart 2761, Chingkok bay to Strait of Sunda. Var. nil.

COAST.—The coast southward of Ipu consists of reddish cliffs, and is fronted by a coral bank which stretches out 4 or 5 miles, with depths of 6 to 10 fathoms on its outer edge; it extends from Ipu to
 5 **Ketahun**, a distance of 30 miles, and should not be approached under depths of 10 or 12 fathoms, as it is steep-to.

Nearly midway between Ipu and **Ketahun** there is the small village of Seblat, appearing like an opening betwixt reddish cliffs; **Ketahun** has a similar appearance. **Ketahun** village has a white cliff or hill to
 10 the southward of it.

Lais and **Palik** are two small villages situated at 17 and 23 miles south-eastward of **Ketahun**, with red cliffs between them.

A shoal, with a depth of about 2 fathoms and not breaking, is reported to lie about half a mile from the coast before the mouth of
 15 the **Ayer Palik** (not charted).

From **Ketahun** the distance is 36 miles to **Benkulen**, and the coast in this space is safe to approach in places to 11 or 12 fathoms, the depths being more regular than farther northward; from 12 to 20 fathoms are good depths to preserve when coasting.

20 *Plan of Benkulen road on 2761.*

BENKULEN (*Lat. 3° 47' S., Long. 102° 15' E.*), an open port, is the capital of the **Benkulen** district, and was known formerly as **Fort Marlborough** under the English occupation. The settlement was first formed on the banks of the river but the locality being so
 25 unhealthy, it was removed to **Ujong Karang** or **Tapu Padri**, the south point of the bay, where **Fort Marlborough** was built on ground a little more elevated in the year 1865.

The town is neat and pleasantly situated on the seashore upon gently undulating land, and behind it lies the drill ground, surrounded by
 30 broad roads covered with white sand and bordered with fine lawns; close to is the spacious dwelling of the Resident. In 1900 the population of **Benkulen** was 6,705, of which 101 were Europeans.

Sungi Benkulen falls into the bay about 1½ miles north-eastward of the town, has from 4 to 6 feet on the bar, and from 8 to 12 feet within.

35 **Communication.**—The Netherlands Royal Packet Company's steamers, running between **Batavia**, **Padang**, and **Penang**, call fortnightly; telegraphic communication by land lines with other ports in **Sumatra**. See Chapter I., pages 18, 19.

Supplies.—Trade.—Cattle, poultry, fruit, and vegetables of
 40 various kinds may be obtained here, and water from a cistern near the landing place.

Agricultural produce is not carried on to any extent. Cattle raising is an important industry, and a considerable number of cattle are exported to **Palembang** yearly. The fishing industry is productive.

General chart 2761.

Plan of Benkulen road on 2761. Var. nil.

Landing.—The landing place is protected from the sea by a rocky ledge fronting the point at a distance of 150 yards; boats pass round the eastern point of this ledge, and then haul in to the southward for the wharf, which is about 60 feet long, with a depth of 3 feet 5
alongside at low water.

Weather signal.—A blue flag is hoisted on the iron standard of the harbour light at the town whenever it is dangerous for boats to go in or out. The office of Harbour master is performed by the Controller of the Native Government. 10

Climate.—The town is unhealthy. Rain is frequent during the months of January and February, the westerly monsoon period. See pages 19, 20. Land and sea breezes prevail here.

BENKULEN ROAD may be considered as lying between Ujong Pedati, 5 miles northward of Benkulen, and Ujong Siabung or 15
Buffel point at about 7 miles to the southward, forming on either side of the town a large bay. See view *e* on page 392.

Inner road.—The inner road, with depths of from 4 to 6 fathoms, lies north-westward of the fort and within Gusong Patah Sambilan; it is frequented by small vessels in the fair season, for the 20
convenience of loading and unloading. The north-westerly winds, which prevail from October to April, when strong, cause a heavy swell and breakers in the roadstead.

Most of the trade is carried on by small coasting steamers. During the south-east monsoon the inner road is perfectly safe. 25

The approach from the northward is between the buoys already mentioned; the southern entrance, between the south Sambilan reef and the shore, has depths of from 3 to 6 fathoms, but is not buoyed.

Pulo Tikus or Rat island lies about 5 miles south-westward of Benkulen, and is surrounded by a coral reef about 2 miles in extent 30
in a north-west and south-east direction, partly dry at low water, and affording shelter from south-westerly winds. Patches with depths of $4\frac{1}{2}$ fathoms over them lie close north-eastward of the main reef, at about three-quarters of a mile from the lighthouse. The island is low and small, with a lighthouse, a few palmyra trees 80 feet high forming 35
a clump, and a useful landmark; also some houses for receiving pepper, a small battery for its protection, and a landing stage.

See Lights, page 397.

Dangers.—**Karang Bayan** and **Karang Ikan Tandu** are two reefs nearly connected, with depths of 5 and 6 fathoms, and 40
situated from 2 to $2\frac{1}{2}$ miles westward of Pulo Tikus; between these reefs and the reef surrounding Pulo Tikus there are depths of 16 fathoms.

Gosong Sungi Lamu, lying about $1\frac{1}{2}$ miles south-west from Ujong Pedati, is the northernmost shoal in the approach to Benkulen. The least water is $2\frac{1}{2}$ fathoms, with 5 to 7 fathoms at a short distance. 45

General chart 2761.

Plan of Benkulen road on 2761. Var. nil.

Gosong Patah Sambilan, or North and South breakers, are two reefs which dry in parts at low water and lie from half a mile to 1½ miles off the town. They do not always break, but as they are liable to do so suddenly, boats should not attempt to cross them.

Buoys.—A conical red buoy, surmounted by a staff and ball, marks the north-east edge of Gosong Patah Sambilan; not to be depended on.

Middle shoal, with a least depth of about 3 fathoms and 8 to 9 fathoms close-to, lies nearly midway between the South Patah Sambilan and Gosong Lampuyang.

Gosong Lampuyang, two reefs, at about 1½ miles southward of Middle shoal, are generally discernible by the sea breaking on them; between them and the shore the depth is 8 fathoms.

These reefs are avoided by keeping in depths above 11 fathoms.

Karang Lebar (*Lat. 3° 56' S., Long. 101° 12' E.*), or Asia shoal, the southern shoal in Benkulen road, is about one mile in extent in an east and west direction, with a charted depth of 4 fathoms (probably less) over coral and sand, and lies about 4 miles westward of Ujong Siabung. There is a heavy ground-swell on it, which sometimes breaks in bad weather.

Anchorage.—The usual anchorage is in about 12 or 13 fathoms water, at about 2 miles, 25° true, from Pulo Tikus. Under that depth the bottom is generally rocky, and also, farther out it is foul in places. Vessels during southerly winds may anchor in 13 fathoms under shelter of Tikus reef, over mud bottom.

The anchorage in the Inner road is in a depth of 6 fathoms, with Tanjong Benkulen bearing 133° true, and Pulo Tikus 227° true. It is perfectly safe during the south-east monsoon season.

Pulo Tikus basin.—There is an excellent basin in the north-east side of Tikus reef, with depths of from 5 to 7 fathoms, over soft mud, and 3 to 2½ fathoms at its upper end. The passage in is close to the edge of the reef on the west side; several detached rocky patches lie off the east side, with 7 and 8 fathoms water close-to.

Sailing vessels having a cargo to receive or deliver at Benkulen used generally to warp into this basin, where they moored head and stern to anchors laid upon the reef, which is steep-to. There are two mooring buoys. From this basin goods were conveyed to or from Benkulen, with the same facility as from the road, the boats being able to make one trip daily with the land and sea breezes. Here vessels were completely sheltered from the sea by the reef, whereas it often runs so high in the road that goods are unsafe in the boats alongside. North-west winds sometimes give very short warning of their approach.

General chart 2761.

Plan of Benkulen road on 2761. Var. nil.

In this season, vessels that do not go into Pulo Tikus basin should anchor eastward and within a mile of Tikus lighthouse, in about 15 fathoms water, where the sea will be partly broken by the reef. Loading and discharging cargo may be done from this position in favourable weather as if a vessel were in the usual anchorage in the road; sailing boats, passing to and fro from the town, are confined to one trip in 24 hours by the land and sea breezes. 5

Pilots are obtainable from Pulo Tikus.

LIGHTS (*Lat. 3° 51' S., Long. 102° 11' E.*).—On Pulo Tikus, from a red and white iron framework support, 98 feet high, erected in the centre of the island, a light is exhibited, at an elevation of 98 feet above high water. See view *f* on page 392. 16

At Benkulen, north-eastward of the tower of Fort Marlborough, a light is exhibited from a white iron support, 26 feet in height, at an elevation of 59 feet above high water. The keeper's dwelling, a stone building, has a red roof. 15

Directions.—North-eastward of Benkulen the land is high and rugged; one of the hills, named Bunkuk or Sugar-loaf, about 3,278 feet high, is a conspicuous mark in some directions from seaward. See also page 393, and view *e* on page 392. 20

The roadstead will be easily made out by the clump of cocoanut trees on Pulo Tikus, which are visible from 12 to 15 miles. The mouth of the river is not easily recognised, Fort Marlborough and a few roofs of houses being the only objects visible from any distance seaward. Near the white iron light-tower at Benkulen the light-keeper's dwelling, with red roof, is somewhat conspicuous. 25

Approaching Benkulen road from the northward, bring Pulo Tikus to bear southward of 124° true, to avoid Karang Bayan and Karang Ikan Tandu. Gunong Bunkuk, bearing 56° true, or eastward of that bearing, until Pulo Tikus lighthouse bears 135° true, leads northward of them, whence course may be taken for the anchorage in the road or for Tikus anchorage. 30

In working to or from the road by this channel, a sailing vessel may stand near the edge of Pulo Tikus reef, and to 13 fathoms towards the Sumatra coast. 35

Coming from the westward, the trees on Pulo Tikus will be seen before Gunong Bunkuk, which is more conspicuous on a nearer approach.

Approaching the road from the southward, Pulo Tikus should not be brought to bear to the westward of 0° true until within 3 miles of it, which will lead westward of Karang Lebar, when steer 22° true for the road. From abreast Pulo Tikus, if bound to the Inner road, haul to the northward, passing westward of the buoy; thence at about 3 cables 40

General chart 2761.

Plan of Benkulen road on 2761. Var. nil.

westward and northward of the buoy marking the north end of Gosong Patak Sambilan.

There is a channel 3 miles wide, within Karang Lebar, with general depths of 17 fathoms. Vessels using this channel should keep within 2 miles of Ujong Siabung until it bears 90° true, and may then steer for Pulo Tikus anchorage, and thence for the Inner road; Ujong Siabung may be approached to the distance of about a mile when working in, for a reef projects from it about a third of a mile, with 3 fathoms on its edge, and the 5-fathoms contour line is distant half a mile from the point with 13 to 14 fathoms close-to. Karang Lebar may be seen by the overfalls on its edges.

Tides.—It is high water, full and change, at Benkulen, at about Vh.; springs rise from 3 to 5 feet. See movements of the tides, pages 366, 367.

Pulau bay, 7 miles to the southward of Benkulen, was formerly an excellent land-locked harbour, 2 miles in length by one mile in breadth. It had an entrance about 2 cables wide, with a depth of 3 fathoms, but at this has silted up it is no longer available as an anchorage.

Sungi Silebar, about one mile north-eastward of Pulau bay, has 4 feet water on its bar; within the bar it forks, stretching both northward and southward, near and parallel to the shore, the southern branch leading to a lake contiguous to the sea, south-eastward of Pulau bay.

Ujong Siabung, or Buffel point, the south point of the bay, is high and densely wooded; the coast reef surrounding it extends for about half a mile.

Ujong Kungkaai, or False Buffel point, a round bluff head-land covered with high trees discernible from Benkulen road, is about 2½ miles southward of Pulau bay.

Chart 2761, Chingkuk bay to the Strait of Sunda.

COAST.—General remarks.—From Ujong Kungkaai the coast of Sumatra extends in a south-easterly direction for a distance of 183 miles, to Flat cape at the western side of the entrance to Sunda strait. Throughout its extent it is almost entirely without shelter, and being beaten by heavy surf the few frequented places are dangerous for landing. The country is also deficient in some of the productions which are found north of the equator. It is in most places bold and safe to approach, and the land is mountainous a short distance inshore.

Aspect.—Gunong Dempo, 10,007 feet high, 30 miles north-east of Ujong Mana, Gunong Dingin, 6,628 feet high, westward of it, and Gunong Peninjawan, 7,303 feet high, between Gunong Dempo and the

General chart 2761.

Chart 2761, Chingkok bay to the Strait of Sunda. Var. nil.

coast, are apparently useful marks for identifying the locality. Within Sambat bay is Gunong Pandan, 5,942 feet, Gunong Pugung, 6,444 feet high, 9 miles from the coast northward of Kru, Gunong Kukusan, 5,512 feet high, eastward of Kru, and Gunong Sekinjau, 5,637 feet high, south-east of it, and many other high peaks, with Gunong Tongkumas or Keizerspiek over Semangka bay, 6,897 feet high (Vol. II.), are probably useful landmarks.

Depths.—Between Benkulen and Mana, regular depths over a sandy bottom are found, where, if it fall calm and the current be unfavourable, a sailing vessel may occasionally find anchorage in moderate depths. Farther to the southward the coast becomes more steep, moderate depths extending out only a short distance, until Little Fortune island, near Flat point, is approached, where they extend 8 miles from the Sumatra coast.

Alas, situated about 35 miles south-eastward of Ujong Kungkaai, is a small pepper port; the best anchorage is in a depth of 12 fathoms, mud bottom. In less depth the ground is foul and rocky.

A reef, which breaks in bad weather, is charted as extending about $2\frac{1}{2}$ miles off-shore, between Alas and Tallo.

A bank, with an estimated depth of 2 fathoms, is charted at the edge of the reef off Alas.

Ujong Mana (*Lat. $4^{\circ} 28'$ S., Long. $102^{\circ} 54'$ E.*), situated about 17 miles south-eastward of Alas, is densely wooded, projects considerably, and may be known by a small hill covered with cocoanut trees; a reef extends more than a mile south-westward of the point, which should be given a wide berth.

Mana town lies in the bight north-eastward of the point. The dwellings are conspicuous. A cascade falls perpendicularly from the steep cliffs which line the shore near Mana, but landing should not be attempted as a heavy surf generally prevails along this coast.

A reef, with a depth of 3 fathoms, lies outside the coast reef, 320° true, distant one mile, from Ujong Mana and 8 cables from the shore.

A reef, which has been seen to break, is charted 2 miles off Pino at 8 miles north-west of Ujong Mana.

Off Ujong Mana, during the easterly monsoon period, heavy rollers get up in 4 fathoms, and a break may occur in depths of 3 fathoms after the sea breeze sets in, thus preventing any communication with the shore. It is therefore not a desirable anchorage.

Pino, another pepper port, lies about 5 miles, Alas about 15 miles north-westward, and Pedang (Padangguchi) at about 15 miles south-eastward of Mana.

General chart 2761.

Plan of Kawur or Sambat bay on 866.

KAWUR or SAMBAT BAY, between Tanjong Bandar and Tanjong Linau, is about 5 miles in width, and on its south-east side is Linau or Kawur settlement, situated on the north side of a high half
5 a mile wide, where small craft find shelter from southerly winds.

LIGHT (*Lat.* $4^{\circ} 49'$ S., *Long.* $103^{\circ} 20'$ E.).—On Ujong Bandar, from a white open ironwork frame support, 42 feet in height, a light is exhibited, at an elevation of 49 feet above high water. *See* Light list.

10 **Anchorage**.—In the north part of the bay, westward of Sungi Sambat, off Bintuan village, there is good shelter from north-westerly and westerly winds, in depths of 9 or 10 fathoms, sand and mud bottom.

The anchorage off Linau is in from 10 to 12 fathoms, with the outer
15 extreme of Ujong Linau bearing about 200° true. Small craft can go nearer the south-east shore. The narrow boat passage leading to the factory is between two rocks, which break at times.

Chart 2761, Chingkok bay to Strait of Sunda.

The coast from Tanjong Linau trends south-eastward for about
20 28 miles to Pulo Pisang Kru and is steep-to. At about 5 miles northward of the latter is a shallow patch at about one mile off-shore, southward of Ujong Pugung.

Plan of Pulo Pisang harbour and Kru road on 866.

PULO PISANG HARBOUR.—**Pulo Pisang Kru**
25 (*Lat.* $5^{\circ} 7'$ S., *Long.* $103^{\circ} 50'$ E.), a quartz rock, somewhat low and slightly wooded, is about one mile in extent, and lies about 30 miles south-eastward of Linau and $1\frac{1}{4}$ miles off-shore; the intermediate coast is steep-to.

A reef, which extends in places about $2\frac{1}{2}$ cables, and on which the
30 sea continually breaks, fronts the southern half of the island, with depths of 36 to 40 fathoms about a quarter of a mile off. A ledge with a depth of about 3 fathoms connects the island with the mainland.

At about one mile northward of Pulo Pisang Kru is a reef of rocks,
on which the sea generally breaks, having from 7 to 20 fathoms close-
35 to, and apparently connected with the shore, which is distant $1\frac{1}{4}$ miles.

Light.—From a white iron framework, 102 feet in height, a light is exhibited, at a height of 249 feet above high water, from the hill at the south-east end of Pisang Kru. *See* Light list.

Anchorage.—Between Pulo Pisang Kru and the Sumatra coast
40 there is anchorage and shelter from north-westerly and westerly winds, in depths of from 12 to 15 fathoms, with the rocks near the east part of the island bearing 180° true, distant about 3 cables, and at three-quarters of a mile from the main.

General chart 2761.

Plan of Pulo Pisang harbour and Kru road on 866. Var. nil.

Directions.—Gunong Pugung, a high and remarkable mountain, 6,444 feet high, situated about 12 miles northward of Pulo Pisang Kru, may be discerned a considerable distance from the offing. Vessels should approach the anchorage under Pulo Pisang Kru from the southward; there appear to be no dangers to avoid excepting the reef extending a short distance from the island. Small craft may enter by the northern channel by keeping at about 2 cables distant from the island shore. 5

Kru road lies 6 miles south-eastward from Pulo Pisang Kru, at the head of a bay which has deep water, there being about 30 fathoms at less than half a mile off-shore in places. The town is situated on the bank of a small river navigable by boats at high water, entered close to the eastward of Tanjong Salobu, the south point of the road, which is visible for some distance from the offing. 10 15

Dangers.—Karang Jati, of coral, with a depth of 10 feet, is about a cable in length in a north and south direction and half a cable in breadth; it lies 355° true, distant 8 cables, from Tanjong Salobu and about 4 cables off-shore.

Foul ground extends from Tanjong Salobu for a distance of 2 cables, with deep water close-to. 20

Buoy.—A red conical buoy is moored, in 3 fathoms, on the southern edge of Karang Jati.

LIGHT (Lat. 5° 11' S., Long. 103° 56' E.).—From a white iron framework, 42 feet in height, on Tanjong Salobu, a light is exhibited, at an elevation of 115 feet above high water. 25

Anchorage.—The anchorage in Kru road is in depths of from 15 to 18 fathoms, over hard sand, westward of the mouth of the river, with Tanjong Salobu bearing about 124° true, distant 5 cables, and Tanjong Karang Pinggan, 202° true. It is safe in the south-east monsoon, being well sheltered from these winds by Karang Pinggan, the south point of the bay; but during the westerly monsoon there is but little shelter in any of these bays, and craft must be prepared to leave at any time. 30

In approaching the settlement from the southward, the houses should be kept open of Tanjong Salobu to avoid the reef off Tanjong Karang Pinggan. 35

Communication.—The Netherlands Royal Packet Company's steamers running between Batavia, Padang, and Penang call fortnightly. 40

Supplies.—Cattle, good water, and some other supplies may be procured here.

General chart 2761.

Plan of Tenumbang bay on 2761.

Tenumbang bay (Lat. $5^{\circ} 20' S.$, Long. $104^{\circ} 0' E.$) lies about 8 miles south-eastward of Tanjong Karang Pinggan, with shallow water extending about one mile off-shore between.

- 5 A reef, which generally breaks heavily, lies on the north-west side of the bay, westward of Sungi Manai, extending about one mile off-shore.

Landing.—There is a surf and breakers on the whole of the steep coast, but landing may be effected in south-easterly winds on the south side of the bay, between a reef and the shore.

Anchorage.—There is anchorage, about half a mile off Padang Manis village, in about 10 fathoms, sand and mud bottom. There is no shelter during westerly winds.

Chart 2761, Chingkuk bay to Strait of Sunda.

- 15 **Coast.—Bengkunat bay** (Lat. $5^{\circ} 34' S.$, Long. $104^{\circ} 13' E.$) is about 19 miles south-eastward of Tenumbang bay, and Bengkunat village lies on the north side of a low point having on it cocoanut trees; Tanjong Sigen (Siging), the north-west extremity of the bay, has a projecting reef, with depths of 20 fathoms close-to, and the bay
20 is interspersed with rocks.

Dangers.—Several reefs lie in the bay, and 3 miles in a 250° true direction from the south point, is the south extreme of a reef 6 miles in length in a north-west and south-east direction; there is a passage for small vessels between it and the shore at either end.

- 25 **Anchorage.**—A vessel intending to touch at Bengkunat should anchor well out to avoid rocky bottom.

Coast.—From Bengkunat bay the coast trends south-eastward for about 30 miles to Flat cape; it is generally low, but inland the country is mountainous.

- 30 **Shoals.**—At about 5 miles southward of Bengkunat bay is a patch of 4 fathoms at 3 miles off-shore, and there is a sunken rock at about a mile off-shore, 8 miles north-west of Flat cape.

Between Bengkunat and Little Fortune island depths of from 10 to 20 fathoms will be found at 2 or 3 miles off-shore.

- 35 *Plan of Belimbing bay on 2761.*

BELIMBING BAY (Lat. $5^{\circ} 54' S.$, Long. $104^{\circ} 33' E.$) is formed by the projections of Flat cape. It is fronted by a bank with depths under 3 fathoms to a distance of a quarter of a mile off-shore. A sunken reef extends $3\frac{1}{2}$ cables northward of Flat cape, with depths
40 under 5 fathoms at 8 cables off.

A patch of $3\frac{3}{4}$ fathoms, with from 6 to 8 fathoms around, is charted with the cape bearing 150° true, distant $1\frac{3}{10}$ miles.

General chart 2761.

Plan of Belimbing bay on 2761. Var. nil.

Anchorage.—There is anchorage, in about 6 fathoms, during the south-east monsoon, with Belimbing village bearing 176° true, distant $1\frac{1}{4}$ miles.

For Flat cape and Little Fortune island, north side of approach to Sunda strait, *see* China Sea Pilot, Vol. II.

General chart 2761.

CHAPTER IX.

ISLANDS OFF THE WEST COAST OF SUMATRA.

 VARIATION IN 1916.—Nil.

GENERAL REMARKS.—A chain of islands extends parallel to the west coast of Sumatra at the distance of about 60 miles between the parallel of 3° N. and $3\frac{1}{2}^{\circ}$ S., covering a space nearly 750 miles in length; they are for the most part unsurveyed.

- 5 *Plan of Simalur island or Pulo Babi on 2201. Var. nil.*

PULO SIMALUR (SIMULU), or Babi, the northernmost of the large islands, is about 54 miles in length, in a north-west and south-east direction, with a breadth varying from 5 to 14 miles, and is about 60 miles from the Sumatra coast; it is hilly, Sibahu
 10 (Sibau) (*Lat. $2^{\circ} 33'$ N., Long. $96^{\circ} 17'$ E.*), the highest peak, being 1,870 feet in height. Gunong Sanulok is the highest peak in the north-west part of the island. *See view a on page 422.* The island is everywhere wooded, as are most of the smaller islands. The coasts are mostly
 15 the south coast of this island was partially submerged by an earthquake. The reefs near to, and between, the several coral islets are steep-to, and, with the exception of those near Pulo Siumat, show up distinctly. The soundings round the island vary greatly, so that the lead is very little guide in approaching the land; a good lookout from
 20 aloft is advisable.

A number of small streams discharge into the bays, but, on account of the difficulty in entering them, few will admit even boats.

The island was formerly subject to the Sultan of Acheh, but is now self-governed under treaty with the Netherlands Government.

- 25 **The monsoons** are the same as on the west coast of Sumatra. From May to December the coasts of Simalur, especially the south, west, and east coasts, are mostly inaccessible: almost everywhere the surf runs high, and the reefs, even those with not less depths than 5 fathoms, can always be distinguished by breakers. The natives consider December the worst month in the year: in that month heavy
 30 rains and north-westerly squalls and high seas prevail on all the coast.

At other times of the year there is frequently considerable surf on the coast, and the swell is always troublesome.

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

A considerable quantity of rain falls throughout the year.

Inhabitants.—The island is thinly populated. The population is largely composed of Nias people, Acheh people, and Malays, nearly all Mohammedans, but all paying little attention to their religion. 5

The original inhabitants are divided into different tribes, each one of which has its own language, but Malay, as spoken in the Padang highland, is generally understood.

They are very primitive, and their only wealth consists in the possession of water buffalo, the number of which is, they say, greatly on the decrease, as the Achinese people on the island steal these beasts, and either kill or export them. 10

The islands around Simalur are of coral formation, and all, with the exception of Pulo Siumat, which has a population of about 5,000, have no settled population, though there are numbers of cocoanut and fruit trees. 15

Trade.—The trade, which is but small, is principally with Singkel, Baros, Susu Susu, Tapat Tuan, and Penang, conducted in native praus.

The imports appear to be confined to cloth, manufactured goods, earthenware, ironwork, and tobacco. In most places the paying medium consists of copper money. 20

The extensive bush is highly profitable, as Semantoh wood is used for building praus and houses; the shipwrights are good workmen, and their craft find a ready sale everywhere on the west coast of Sumatra. There is coal on the island, but in such widely distributed areas that the output is not in proportion to the expense of working it. 25

The principal productions are buffaloes; buffalo hides, cocoanut, rice, ebony, and bush products are the chief exports, but only the coast land is under cultivation. 30

Tidal streams.—During the stay of the surveying vessel *Benkulan*, a south-easterly set was observed on the north-east coast, from about one hour after the rising and setting of the moon up to the time of the moon's meridian passage; during the remainder of the time, the stream ran to the north-west at a rate of a half to one knot. The mean rise was from 2 to 3 feet. 35

UJONG LIWA (*Lat. 2° 56' N., Long. 95° 50' E.*), the northern point of Simalur, is easily recognised when coming from the eastward. On the north and east sides the bottom for over a mile is rocky and uneven, with some shoal spots. 40

Pulo Penju (Ina), an overgrown islet, is situated $2\frac{1}{4}$ miles westward of Ujong Liwa at $1\frac{1}{4}$ miles off-shore. At about 2 miles north and north-east of it are patches of 5 fathoms, and from 8 to 12 cables distant north-west of it are patches of 4 to $4\frac{1}{2}$ fathoms, as charted.

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

The description of the island will be given south-eastward from Tanjong Liwa and up the west coast.

Rock.—A rock of $2\frac{1}{2}$ fathoms lies one mile north-eastward of this point.

Liwa (Sibobe) bay is situated eastward of Tanjong Liwa. In the middle of the bay is Yabatti, a sandbank, which apparently dries; the bay is much encumbered with reefs.

Van Rossum reef, with a depth of $1\frac{1}{2}$ fathoms, lies 10° true, distant $1\frac{1}{2}$ miles from the east point of Liwa bay; it shows discoloured water, and sometimes breaks. Between it and the point are patches of $2\frac{1}{2}$ and $2\frac{3}{4}$ fathoms.

Anchorage.—The deepest part of the bay is between the sand cays or banks, where there is good anchorage in 20 fathoms, over mud, with the east point of the bay bearing 98° true; the passage to this anchorage is, however, very narrow, and it is not advisable to enter without local knowledge.

No directions are offered for this anchorage, the chart being on too small a scale.

Sibobe village lies in the eastern part of the bay near a lagoon (was deserted in 1901), and Liwa village lies near Tanjong Liwa.

COAST.—From Ujong Sangiwa (Sanggiran) (*Lat. $2^\circ 55' N.$, Long. $95^\circ 54' E.$*), which has a large village eastward of it and lies about 2 miles to the eastward of Liwa bay, the coast trends to the south-eastward for about $1\frac{1}{4}$ miles to Ujong Sibalung, and thence more southward for a distance of 2 miles to Ujong Semigu (Sibigo).

A reef extends about 5 cables off Ujong Semigu.

Pulo Kichik and Pulo Penju (Kara), two islands connected by a shallow ridge, lie south-eastward of Ujong Semigu, leaving, between that point and the former island, a narrow channel.

Lugo Bigo (Lugo Sibigo) bay has an entrance about $1\frac{1}{2}$ cables in width, at about a mile southward of Ujong Semigu, inside which it expands into a bay about 3 miles in length in which are three islets; several lagoons communicate with the bay, and on its shores are Laulo, Mikim (Mitim), and Baba Lugo (Sibigo) villages.

The northern and western parts of this bay are much encumbered by rocks, as also southward of Bunon islet, in the southern part of the bay. Two reefs, with depths of 2 feet, marked by beacons, and having deep water between them, are situated southward of Bunon.

Rocks.—A line of rocks with a depth of less than 6 feet extends 5 cables northward of Pulo Bunon (Mitim).

Directions.—The best approach is between Pulo Penju and Pulo Hulawan (Tinggi), with Safacha hill, 722 feet high (not charted),

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

bearing 240° true, until abreast the reef extending southward of Pulo Penju, thence steering for the entrance of the bay on a 274° true course. Approaching the bay, the north side should be kept and the bay entered on a 231° true course, when a safe anchorage in from 20 to 22 fathoms, mud bottom, will be found in the southern part of the bay. Beacons are erected on some of the shallow reefs for the use of those locally acquainted. 5

Sigulei bay is $4\frac{1}{2}$ miles south-eastward of Ujong Semigu, and northward of it lie Pulo Hulawan (Tinggi) and Pulo Gala Gala; a sand cay, overgrown with vegetation, named Karang, lies westward of the latter with shallow patches between, extends nearly half a mile north-westward from Karang. 10

A shoal of 2 fathoms lies midway between Karang and Hulawan; the latter is surrounded by a narrow reef. 15

A patch of $1\frac{1}{2}$ fathoms lies westward of Gala Gala, between it and the shore.

Anchorage may be obtained in a depth of 16 fathoms, in Sigulei bay with the west point of Pulo Gala Gala bearing 0° true, and Ujong Sigulei 109° true. 20

Sungi Sigulei falls into the sea near the point of that name, off which is a sandbank that extends for about 2 cables. Sigulei village is situated on the river near the mouth.

Reefs.—A reef extends about 3 cables off Ujong Sigulei, and a detached reef, with a depth of one fathom, lies 92° true, distant 7 cables from the point. 25

Coast.—The coast from Ujong Sigulei trends south-eastward to Sembilang, a large village. Pulo Asu, lying north-east of it, is overgrown with vegetation and surrounded by a narrow reef.

Dangers.—A one-fathom patch lies about $2\frac{3}{4}$ miles, 105° true, from Pulo Asu, and discoloured water was observed between the reef and the islet, depths of from 5 to 8 fathoms being found southward of it. 30

Lho Ungkun.—Close southward of Sembilang village is a small bay named Lho Ungkun, where good anchorage may be obtained; a sandbank lies in the approach, which can be passed on either side. From this bay the coast still maintains a south-easterly direction for $5\frac{1}{2}$ miles to Ujong Siango, southward of which is Lugu Ama Siango; a reef extends 3 cables off Ujong Siango. 35

Lugu Ama Siango (Sugu Sibabu) bay is about 2 miles in extent, and is entered between Pulo Balu (Falu) and the point south of it; both sides are fringed with reef. Anchorage is found in from 10 fathoms to 22 fathoms nearly all over the bay. 40

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

There are several villages around the bay, and a narrow channel leading to the north part of the bay, only available by very small craft or boats.

5 **TELOK DALAM** (*Lat. 2° 39' N., Long. 96° 11' E.*) (called Lugu Langeni by the natives, meaning a quiet anchorage), a bay situated 4 miles southward of Ujong Siango, penetrates about 4 miles into the island, and is 6 miles long in a north-west and south-east direction.

10 It can easily be made out from seaward by Langeni hill, 427 feet high, which lies on the southern side of the entrance, and also by Pulo Lampau or Baba, of moderate height, in the middle of the entrance, which island is covered with palmyra trees, and is uninhabited. Pulo Balung, a small islet, lies about three-quarters of a mile westward of
15 Pulo Lampau.

The coastline is everywhere low and fairly steep-to, broken up into a number of small bays, and is also fronted by many small islets, which, on account of being only a short distance from the coast, are not noticeable.

20 The general depths in the bay are from 20 to 25 fathoms, muddy bottom, whilst outside, off the bay, the depths are from 40 to 50 fathoms, bottom grey sand with shells and coral.

On the south side of the bay is a range of hills about 1,200 feet high, and to the south-eastward is Kwala Baru, a mountain 1,250 feet high,

25 whose slopes also come down to the shore of the bay.

Shoals.—A shoal of $4\frac{1}{2}$ fathoms is situated midway between the north point of Pulo Lampau and the north entrance point, and a shoal of $4\frac{1}{2}$ fathoms at 4 cables eastward of the south extreme of Pulo Lampau; vessels entering by this passage, which is the better of the
30 two, should keep close to the island, which is clear.

A group of islets is situated southward of Pulo Balung, and a rock with less than 6 feet at $1\frac{1}{4}$ miles westward of that islet.

A rock which dries is situated in the centre of the southern arm.

Lugu Langeni, a small village, is situated on the west side of the
35 bay, opposite the entrance, with about 30 inhabitants.

Directions.—The approach between the north point of the bay and the reef that extends to the north-eastward from the opposite shore, is about half a mile in breadth and clear of danger; the northern side of the fairway is, however, to be preferred, in order to keep clear
40 of the above-mentioned reef; Pulo Lampau can be passed on either side, but the eastern is preferable as before mentioned, passing close to the east end of the island to avoid the patch of $4\frac{1}{2}$ fathoms. There is a patch of same depth in the western channel, as charted.

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

COAST.—The coast from Telok Dalam follows a general south-easterly direction as far as Telok Lingi, a distance of 14 miles.

For the first $2\frac{1}{2}$ miles a reef extends to a distance of more than a mile from the coast, and on it are many rocks above water, some of which have vegetation on them. The reef then recedes, forming a bight, on the eastern side of which it again extends out in the form of a spit to a distance of 2 miles; on the outer end are many rocks, above and below water, and on the inner end, at a distance of about half a mile from the shore, is Pulo Pinang, joined to the mainland by a sunken ledge, with rocks above water and a small islet; south-eastward of the island the reef extends but a short distance from the coast.

A large detached reef lies 101° true about a mile from Pulo Pinang; on the outer end are Cornelis rocks above water, which may be seen from some distance.

Anchorage with a muddy bottom can be obtained either to the northward or southward of Pulo Pinang, but the approach is difficult on account of the reefs.

Kwala Baru is the mouth of a rapid stream, having its source in the Sibahu mountains; near it is a village of the same name.

A reef, one cable long in an east and west direction, and a quarter of a cable wide, having a depth of 6 feet, with from 29 to 30 fathoms around, is situated 66° true, at a distance of one mile from Baru village.

Caution.—From 7 miles eastward of this village the coast is fronted by an area containing many reefs extending to Pulo Siumat, with narrow deep channels between. The north-western and south-eastern edges of this area are marked by several low islets, more or less covered with brushwood and trees.

Pulo Talam and Pulo Limau are situated on the northern portion of this area.

Uma village, situated in a small bay, is 5 miles south-eastward of Baru; between is Ayer Pinang village. At the former is a mosque, the roof of which, when the sun shines on it, forms a good landmark.

Dog reefs (*Lat. $2^\circ 41'$ N., Long. $96^\circ 19'$ E.*), a cluster of coral reefs, about half a mile in extent, with depths of from one to 3 fathoms, and showing discoloured water, lies $4\frac{1}{4}$ miles north-westward of the north point of Pulo Siumat.

Pulo Siumat, lying about 6 miles off the coast, northward of Telok Tingi, is over $2\frac{1}{2}$ miles in length, with a breadth of about half a mile.

It is covered with tall trees, the tops of which attain a height of 359 feet, and is the only island off the coast of Simalur that has a

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

settled population, who cultivate the cocoanut, the nutmeg, and the cotton tree. No snakes or wild pigs are found here as they are on the other islands.

- 5 **Reefs** extend westward and northward of the island to a distance of about one mile, and from the eastern point to about 3 cables. On the two latter are rocks showing above high water.

A narrow reef which dries in places, and $1\frac{1}{4}$ miles long in an east and west direction, is situated half a mile northward of the north-west
10 extreme. For others *see* the chart.

Anchorage.—There is a village on the south side of the island, off which, at a distance of about half a mile, outside the sunken rocks, there is anchorage in depths of from 24 to 27 fathoms. The bottom is very irregular.

- 15 The anchorage can only be approached by keeping a good lookout from aloft, as there are many reefs in both approaches. Probably a native pilot is obtainable from the island.

Islets.—On the south-east margin of the foul area are several islets.

- 20 Pulo Mentari (Mentahari) (*Lat. $2^{\circ} 36' N.$, Long. $96^{\circ} 23' E.$*), the northernmost, has some brushwood growing on it, and is conspicuous from a distance by its white sandy beach; it is surrounded by a reef on which are some rocks above water.

- 25 Pulo Kasik, about three-quarters of a mile southward of Pulo Mentari, has very light-coloured vegetation, whilst Pulo Tupa Kechil, the next island to the southward, is the only one in the locality having cocoanut palms; Pulo Tamban (Tupa Besar), nearer the shore, has very little vegetation.

- 30 **TELOK LINGI** is clear of dangers, and affords good anchorage in depths of from 15 to 20 fathoms, over mud. The approach has a number of dangers, and the bay can only be entered with local knowledge, or by a good look-out from aloft.

- 35 Pulo Benah, an islet, overgrown with tall trees and some cocoanut palms, is so close to the northern point of the entrance as to appear to be connected with it.

On the south-east side of the bay, upon a hill on Pulo Panjang Besar, is a large tree, 462 feet above high water, which is conspicuous from a distance. A narrow passage lies southward of the island, leading to Sinabang bay.

- 40 Pulo Lampaseh, a small islet, covered with tall trees, lies in the middle of the entrance to the bay; it can be passed close to on either side.

There are two bights in Telok Lingi, in the southern of which there are depths of 4 to 6 fathoms, but the entrance is narrow.

General chart 2760.

Plan of Simalur island or Pulo Babi on 2201. Var. nil.

Dangers.—Pulo Ketek and Pulo Naru are two islets lying to the westward of the approach to Telok Lingi. They are both surrounded by broad coral reefs; that extending south-eastward from Pulo Ketek, being marked, near its edge, by rocks above water. Pulo Naru (Aru) 5 has a tall, dead tree on it rising above the others, and near it lies an atoll-shaped islet with several clumps of small trees. Two other small islets lie northward of the approach to Telok Lingi, and are surrounded by reefs with rocks above water and awash.

Sumbawa reefs are four in number, and lie between Ketek 10 and Jawi Jawi islands. The shoalest of these reefs has a least depth of 10 feet, and lies with the south-west point of Pulo Babi in line with the north point of Pulo Jawi Jawi.

Pulo Jawi Jawi, south-eastward of Sumbawa reefs, is a small, low, round islet, with brushwood growing in places, and from a distance 15 has the appearance of three islands; about 2 cables off its east and west sides there is a rock, and others lie between it and Telok Lingi (Pulo Awah): a small islet situated 7 cables, 259° true, from Jawi Jawi has some high trees; another, which lies in the middle of the approach, is also overgrown with high trees. 20

Directions.—Vessels bound for Telok Lingi from the eastward should proceed as far as Sinabang bay until abreast the white beacon on the reef southward of Babi, thence they can proceed for Lingi, avoiding charted dangers.

Plan of Sinabang bay on 2284.

SINABANG BAY (Lat. 2° 28' N., Long. 96° 24' E.), entered about 1½ miles southward of Pulo Babi, is half a mile wide in the entrance, and extends in for a distance of about 3 miles, and for about 2 miles of its length, at which distance is the village of the same name, the depths are considerable. The fairway to the anchorage, between 30 the dangers lying near Pulo Babi and a reef extending north-eastward of the eastern entrance point, is deep, but requires a careful lookout from aloft.

Pulo Babi, 80 feet high, lies about 1½ miles south-eastward of Pulo Jawi Jawi, west side of approach to Sinabang bay, and is an 35 overgrown atoll; several dangers lie near it.

Pulo Rangsang (Rangasa), half a mile south-westward of Pulo Babi, is low and overgrown with shrubs; between it and Pulo Babi there is a depth of 7 fathoms.

Beacons.—Reefs extend for a distance of 5½ cables southward of Pulo Babi; the southern extreme is marked by a white screw pile beacon with ball. Between and north-westward of a line joining this beacon to the west point of the entrance to the bay are reefs and islets, as 40 charted.

General chart 2760.

Plan of Sinabang bay on 2284. Var. nil.

A black iron screw pile beacon, surmounted by a truncated cone, marks the edge of the coast reef on the eastern side of the approach to the entrance, in 10 feet water, situated 270° true from the north-western of two small islets which lie near the northern extreme of the reef extending north-east from the eastern entrance point, and 101° true, 3½ cables, from the white beacon.

A black beacon with truncated cone topmark marks the north end of the long spit extending northward of Ujong Ama Palu, at about half a mile eastward of Sinabang village.

Lights.—From a rock off Ujong Babang, east side of the entrance, a light is exhibited. *See* Light list and charts.

From a white iron framework, 39 feet in height, erected on the northern slope of the hill 2 cables southward of Ujong Babang, a light is exhibited.

From the reef at the eastern extreme of Panjang Kechil, a light is exhibited, at an elevation of 16 feet above high water.

A light, elevated 13 feet, is exhibited on Tanjong Labana.

The light on Ujong Babang, in line with that on Panjang Kechil, bearing 211° true, leads eastward of the shoals extending from Pulo Rangasan.

Anchorage.—Good anchorage may be obtained in depths of from 6 to 8 fathoms off Sinabang village and to the southward of Panjang Kechil; or in depths of 15 to 19 fathoms, about one-third of a mile northward of the village, eastward of Pulo Amau Obe. There is a small stream near the village, but it is not even navigable by boats.

Piers.—There is an examination station at Sinabang, and two boat piers.

Plan of Simalur island on 2201, and Sinabang bay on 2284.

Directions.—For steam vessels using the necessary precautions Sinabang bay presents no great difficulties.

Vessels bound there from the southward can easily recognise their position by Batu Belayar, 47 feet high, situated off Pulo Panarusan, at the east point of Simalur.

From abreast this point course can be shaped to pass eastward of Pulo Mendanga, so as to avoid the patch of 2 fathoms situated between it and the coast reef, or, if passing inside, keep near the island in order to avoid it. Steer outside of Pulo Babi, with Pulo Mendanga astern, bearing about 127° true, until the mark for the entrance is coming on, namely, the zinc roof of a house, at Sinabang village, between the eastern end of Panjang Kechil and Tanjong Babang, the eastern entrance point, bearing about 216° true, which leads between the beacons marking the reefs on either side of the approach to the bay. Give Tanjong Babang a berth of about 2 cables, thence passing between

General charts 2201, 2760.

Plan of Simalur island on 2201, and Sinabang bay on 2284. Var. nil.
Panjang Kechil and Tanjong Labana; from thence passing westward of Pulo Pandan if bound to the anchorage abreast of Amau Obe, or eastward of it if going to the anchorage east of Sinabang, with the black beacon on the spit bearing about 180° true until near it, thence 5
 for the anchorage.

At night.—The *white flashing* light on the pile within Ujong Babang bearing about 207° true will lead towards and southward of Pulo Babi, taking care to get the leading lights in line from outside it. The light on Panjang Kechil in line with the light on the rock at 10
 Ujong Babang, leads in.

When at about half a mile from Tanjong Babang light steer to give it a berth of about 2 cables, thence passing between Pulo Panjang Kechil and Tanjong Labana lights, from whence a bearing of the latter, astern, keeping the light on Ujong Babang in sight, will assist 15
 in leading a vessel to the eastern anchorage off the village.

From the northward, vessels sight Pulo Siumat, 359 feet high, and after rounding its east point, at a safe distance to avoid the reef extending from it, can steer for Pulo Mendanga, until the leading mark for the entrance comes on, from whence course may be shaped 20
 for the bay, as before.

Tides.—The average rise of the tide amounts to about 3 to 4 feet. See page 424.

Plan of Simalur island on 2201.

COAST.—The coast of the south-eastern part of Simalur consists of low land with tall trees, except off Gunong Sibahu, whose slopes come down to the coast. 25

Gunong Sinabang (*Lat. $2^{\circ} 26\frac{1}{2}'$ N., Long. $96^{\circ} 24\frac{1}{4}'$ E.*), 881 feet high, to the southward of the bay of that name, has a saddle-back summit, rendered very remarkable by having a small cone in 30
 the saddle.

From the east point of Sinabang bay the coast trends to the south-eastward.

The shore reef off this point extends to a distance of nearly a mile, near its extremity being two rocks above water; from thence it 35
 gradually decreases in breadth, until it disappears at a short distance north of Ujong Lataling. On its outer edge are many rocks, showing a short distance above the water, and nearer the shore is Pulo Biawak, a small wooded islet.

At a distance of about $1\frac{1}{2}$ miles from this part of the coast is Pulo 40
 Mendanga (Si Manangah), a coral islet having a small fringing reef, on which are some rocks above water; there are some cocoanut trees on the north-west side, and it is conspicuous from some distance owing to its white coral beach.

General chart 2760.

Plan of Simalur island on 2201. Var. nil.

Between Mendanga and the shore reef is a patch of 2 fathoms.

Between Ujong Anao (Mata Tuabing), which lies over a mile to the south-eastward of Ujong Lataling and Ujong Pulo, is Telok Panarusan, which, being much encumbered with rocks, is impracticable for vessels.

Pulo Panarusan (Batu Belayar) forms its eastern side.

To the northward of this bay, behind a narrow strip of low land, is a hilly ridge overgrown with tall trees; a conical-shaped clump of trees, which can be distinctly seen from all directions, forming the highest point at an elevation of 876 feet.

Anchorage.—Off Lataling village, $2\frac{1}{2}$ miles south-eastward of Pulo Biawak, anchorage can be obtained in a more moderate depth than is usually found on this coast.

Ujong Pulo (Batu Belayar) (*Lat.* $2^{\circ} 25' N.$, *Long.* $96^{\circ} 31' E.$) is the east point of Pulo Panarusan, and on the extremity of the reef which runs off this well-defined point is Barat Belayar, a remarkable rock of dark stone, 47 feet high, which has the appearance of a native praa; another rock lies between Barat Belayar and Ujong Pulo, but it is not so high.

Anchorage.—About half a mile southward of Barat Belayar fairly good anchorage may be obtained in a depth of 10 fathoms, over sand.

Plan of Labuan-Bajau bay on 2201.

LABUAN-BAJAU BAY (*Lat.* $2^{\circ} 25' N.$, *Long.* $96^{\circ} 31' E.$) southward of Ujong Pulo and between it and Ujong Lentang (Matankeli) is Labuan-bajau bay, in the north-west part of which is the entrance to the Anao channel or Telok Panarusan, which separates Pulo Panarusan from the main island; it is much encumbered with rocks, and only navigable for vessels of light draught. In the western part of the bay is a cove, named Telok Dalam, in which is situated Kota Tingi village.

This bay is clear of danger except for the shore reef, which in places extends some cables distance off; small craft should not venture within the 5-fathoms contour line.

Anchorage.—There is tolerably good anchorage in about 15 fathoms, over muddy bottom, with Ujong Lentang (Matankeli) bearing about 175° true, distant $1\frac{1}{2}$ miles; also good anchorage in Telok Dalam, in a depth of about 15 fathoms, off Kota Tingi village.

Ujong Lentang is low and noticeable, especially from the southward; the shore reef between it and Ujong Latiun extends for a distance of $1\frac{1}{4}$ miles from the shore, and can easily be seen by the discolouration of the water.

General charts 2201, 2760.

Plan of Simalur island on 2201.

Ujong Bajan (Massin) is the most southerly point of the island; Tanjong Tubah is $4\frac{1}{2}$ miles westward of Ujong Bajan, and this part of the coast to Ujong Lentang is uninhabited, and there are no streams of water. 5

Dangers.—A reef, with a depth of 3 fathoms, is situated 2 miles south-eastward of Ujong Bajan.

Foul ground extends nearly 3 miles southward of Ujong Latium and Ujong Bajan, there being a depth of 7 fathoms only at that distance. It should be given a wide berth. 10

Karang Ujong Tubah, with a depth of 4 fathoms, is situated $2\frac{1}{4}$ miles, 235° true, from Ujong Bajan.

Coast.—From Ujong Tubah to Ujong Kakat, a distance of about 6 miles, the coast trends in a westerly direction; there are breakers all along this part of the coast, but as the shore reef has but little breadth they may safely be approached to a distance of about a mile. 15

Tapak (Tepak) bay (*Lat. $2^\circ 25'$ N., Long. $86^\circ 18'$ E.*) lies between Ujong Kakat, a well-defined rocky point, and Ujong Lasingalu, which is low and situated about 7 miles to the north-westward of it. The shore reef in places extends to some distance, especially on the north side of the bay, where it extends 8 cables off. 20

Islands.—Off the bay lie Pulo Tapak and Pulo Minchau, and to the southward of Ujong Lasingalu is Pulo Siavelak.

Pulo Tapak (Tepak) is a hilly island surrounded by a narrow reef; the rocky north point of the island can easily be made out from a considerable distance. The bight on its north side, known as Telok Pangku, is foul, as charted. 25

Pulo Minchau is smaller and lower than Pulo Tapak; on the western side a reef extends 2 miles from it. Off its extreme are rocks covered with vegetation. 30

There is a clear passage known as Minchau strait between Tapak and Minchau, the least water being 6 fathoms between the reefs on either side.

Pulo Siavelak, very small, is wooded and encircled by a reef that extends a quarter of a mile from it. 35

The coast reef fronting Ujong Lasingalu extends nearly a mile off it with a depth of 2 fathoms near its extreme. The passage between it and Siavelak should not be used.

Foul ground extends one mile eastward and $1\frac{1}{2}$ miles southward of Siavelak, to within a mile of Pulo Tapak. 40

General charts 2201, 2760.

Plan of Tapak bay on 2284.

Centario reef, half a mile in extent, with a depth of $2\frac{1}{2}$ fathoms, and steep-to, lies with the north-eastern extreme of Pulo Tapak bearing 234° true, distant $1\frac{1}{2}$ miles. It can at times be distinguished by breakers, or by the discolouration of the water.

The north points of Pulo Tapak and Pulo Minchau in line, bearing 259° true, lead southward of this reef, and Pulo Minchau well open northward of Pulo Tapak, 238° true, leads northward of it.

Reef is charted as extending half a mile off the eastern shore of Tapak bay between Ujong Sidowo (Batu Sidufu) and Ujong Pasung, known as Ameli reef; also at about the same distance off Ujong Nabulu un and Katat, the south-east points of the bay.

Telok Gosong is a bight between Ujong Sidowo and Ujong Pasung, used by native boats.

Anchorage.—There is good anchorage in about 10 fathoms, over mud, off Lessikin, which is the principal village in the bay, with the mouth of Sungai Lessikin bearing about 122° true, and Ujong Sidowo 167° true.

Plan of Simalur island on 2201.

Lauheh bay.—Ujong Lasingalu is low and the village of the same name is near it, with a stream to the eastward which can be entered by boats; from it the coast trends in a north-west direction for 9 miles to Ujong Mattan-Tohtoh on the east side of Lauheh bay, in which is anchorage in a depth of 8 fathoms, over sandy bottom.

Off this part of the coast the reef extends for some distance, especially off Ujong Lauheh, where it extends from 3 to 4 cables.

Deh reef, with less depths than 3 fathoms, lies 220° true, distant 2 miles from Ujong Lauheh.

A reef, with less depths than 3 fathoms water, lies midway between Deh reef and the point; both apparently always break.

There is a passage 3 cables wide between the coast reef at Ujong Lauheh and the reef just mentioned.

Plan of Channel between Great and Little Simalur on 2284.

Karang Sulang, which breaks, lies $2\frac{3}{10}$ miles, 180° true, from Deh reef, with the north point of Simalur Chut bearing 288° true.

Laureu-eu (Laru u) bay, about 2 miles in extent, east and west, lies between the point of same name and Ujong Lambajo its eastern extreme. It is fringed by reef to a short distance, but extending over 3 cables from Ujong Lambajo.

Reefs.—Reef extends three-quarters of a mile southward of Ujong Raban, and a detached reef with $1\frac{1}{2}$ fathoms to about the same distance southward of Ujong Laru u.

General charts 2201, 2760.

Plan of Channel between Great and Little Simalur on 2284. Var. nil.

A reef, with a depth of $3\frac{1}{2}$ fathoms, is charted $2\frac{9}{10}$ miles 250° true from Ujong Lambajo.

Rindu, with a depth of $3\frac{1}{2}$ fathoms, lies $1\frac{3}{4}$ miles south-westward of Ujong Lambajo. 5

A reef with $2\frac{1}{2}$ fathoms lies in the fairway of the channel, between the north extreme of Pulo Simalur Chut, and the reef extending from Ujong Raban.

A patch of 5 fathoms lies with Ujong Lambajo bearing 348° true, distant $3\frac{1}{4}$ miles; there is probably less water as it breaks, and the fishermen state there are depths under 2 fathoms. 10

Anchorage.—In the middle of the bay, towards its head, there is good anchorage in from 6 to 8 fathoms, over mud or sand, about 8 cables eastward of Ujong Laureu-eu. There is generally a swell here, and that northward of Simalur Chut is preferable. 15

There is a landing place in the bay from which there is a short route to Simalur village.

Pulo Simalur Chut, or Little Simalur, is a hilly island, 295 feet high, over 2 miles in length, lying to the south-westward of Laureu-eu bay. It is encircled by a reef which, except off the eastern and western extreme of the island, where it extends about a mile, is of but little extent. A tidal wave nearly destroyed the island in 1907, and a large portion of the south coast of Simalur was also laid waste. The plan must be used with considerable caution. 20

Anchorage.—There is, or was, good anchorage off the village on the north-east side of the island in depths of 7 to 12 fathoms; with the north point bearing 290° true, and the east point 133° true, there is a depth of 8 fathoms. 25

Plan of Simalur island on 2201.

COAST.—The coast from Ujong Raban trends in a north-west direction for about 3 miles to Ujong Labongan (Mata Bano), and then recedes, forming Lingam bay; between these points the coast reef extends in places nearly half a mile. 30

About a mile north-westward of Ujong Raban, there is a small bay, with 4 fathoms water, over sand, in its centre, where praams find shelter, and on a hill is Simalur village; landing is easy on this part of the coast. 35

Anching, a patch of 3 fathoms, is charted with Ujong Raban bearing 72° true, distant 4 miles, in the southern approach to Lingam bay. 40

Lingam bay, between Ujong Labongan and Ujong Usuj, has depths of 9 to 12 fathoms; two streams empty themselves into the bay, which is uninhabited.

General chart 2760.

Plan of Simalur island on 2201. Var. nil.

Ujong Usuj (Lat. $2^{\circ} 37' N.$, Long. $95^{\circ} 52' E.$), the western point of Lingam bay, is low, but is noticeable on account of a conspicuous tree standing in its immediate neighbourhood. The shore reef near this point extends nearly half a mile south-eastward of it. A patch of 3½ fathoms lies one mile south-west of the point.

Pulo Lingam, on the eastern side of the bay, is surrounded by a reef, which extends half a mile off its north side where it partly dries. On the east side the island is steep-to, and it is advisable to keep close to that side when making the bay from the eastward, in order to avoid the reef that extends about 6 cables from Ujong Labongan, the south-east point of the bay.

Anchorage may be obtained in a depth of 8 fathoms, over mud, about one mile north-eastward of Pulo Lingam.

Ujong Aloajan, the south-west extreme of Simalur, is a remarkable precipitous point; the reef off it extends about 2 cables.

Between the point and Ujong Usuj is a bay, in the entrance of which there is a patch of 4 fathoms.

A patch of 5½ fathoms lies about 1½ miles, 210° true, from Ujong Aloajan, with a patch of 6 fathoms at half a mile south-east of it; the bottom is irregular here, and less water may exist off and around the point.

Anchorage near it can be obtained off Ujong Aloajan, in from 14 to 17 fathoms water, over sand.

Karang Rindu or Sawang (Sufan) lies nearly 3 miles southward of Ujong Aloajan and is over 2 miles in length in an east and west direction, with a least depth of $2\frac{1}{4}$ fathoms; in rough weather it breaks over its whole extent, whilst parts of it apparently break even in fine weather.

Lakuan (Lakon) bay.—The coast from Ujong Aloajan trends in a general north-westerly direction for about $6\frac{1}{2}$ miles, and between are two conspicuous hills named Ujung and Lakuan (Lakon); from thence it trends westward as far as Ujong Tubah, forming the north side of Lakuan bay, the south side being formed by the island of that name.

In the eastern part of the bay, inside the 5-fathoms contour line, is a shoal, on which there is only a few feet of water (not charted).

Pulo Lakuan (Lakon) is nearly 3 miles in length, in an easterly and westerly direction. Its summit, an oblong hill, is said to be visible from a distance of 20 miles.

Shoal water extends about half a mile off the western end, and on the north side to about the same distance; there is a village on the north side of this island.

General chart 2760.

Plan of Simalur island on 2201. Var. nil.

Anchorage.—Good anchorage may be obtained in the bay off the north side of the island in a depth of 10 fathoms, over sand. The Dutch vessel of war *Merapi* anchored in $6\frac{1}{2}$ fathoms, with the west point of the island bearing 248° true, and the north point of the bay 294° true. 5

Benkulen bay (Telok Dalam) is small, almost landlocked, and entered from the northern side of Lakuan bay; the reefs on either side of the entrance leave only a narrow fairway, in which the least depth is 3 fathoms. 10

There are depths of from 2 to $2\frac{1}{2}$ fathoms, over mud, off the village, and this is a safe place for small craft to lie, but it is recommended to mark the reefs before entering.

Ujong Melabah (Sumbu) (*Lat. $2^\circ 46'$ N., Long. $95^\circ 43'$ E.*) is the west point of Pulo Simalur; between it and Ujong Tubah foul ground is charted as extending a mile from the coast. 15

Outlying banks.—A bank on which the depth is 7 fathoms is charted 298° true, distant $4\frac{1}{2}$ miles from Ujong Melabah; there are others with 6 to 7 fathoms charted between it and Pulo Sa Laut, 23 miles to the north-westward; less water may exist. 20

A bank with depths of 6 and 7 fathoms was found by the Netherlands vessel of war *Timor* in 1869. The 6 fathoms is charted 300° true, distant $9\frac{1}{2}$ miles from Ujong Melabah; it is marked by discoloured water, and the bottom was distinctly seen when over it.

A similar bank is charted 5 miles north-west of it. 25

Si Ambong-Ambong rocks lie at about $3\frac{1}{2}$ miles northward of Ujong Melabah, at a distance of about three-quarters of a mile from the coast. They consist of three rocks above water, which can be distinguished from some distance.

Coast.—The coast from Ujong Melabah trends in a north-north-easterly direction for $3\frac{1}{2}$ miles to Ujong Loban, when it curves to the north-eastward and eastward, receding and forming Simalandan bay. 30

SIMALANDAN BAY, about $1\frac{1}{2}$ miles wide, is about 2 miles in extent, and has deep water; there is little shore reef except on the north side, where it extends about $1\frac{1}{2}$ cables. There are several islands in its inner part, the largest being named Pulo Panjang; the channels on either side of this island are navigable, but that northward and north-eastward of the island appears to be preferable; in the inner bay the bottom is rocky. 35 40

Ujong Araman (*Lat. $2^\circ 50'$ N., Long. $95^\circ 46'$ E.*), the south-west point of the entrance, is covered with large trees and easily distinguished; a reef about 2 cables in breadth and steep-to extends

General chart 2760.

Plan of Simalur island on 2201. Var. nil.

off this point, and eastward of the point is the mouth of a stream named Silolo. Between the point and the river are three square-shaped rocks, eastward of which a sandy beach commences.

- 5 **Langi village**, with some small houses, and about 200 poor inhabitants, has a reef extending about 3 cables off it.

Shallow water extends about 3 cables off Ujong Langi, the point eastward of the village.

Fish, poultry, and fruit are obtainable in exchange for tobacco.

- 10 **Anchorage** may be obtained in 10 fathoms water off Langi village, with some shelter during the westerly monsoon; but little swell comes in.

- 15 **Simalandan reef**, with a depth of $2\frac{1}{2}$ fathoms, lies to the northward of Ujong Langi, with a channel 2 cables in breadth between it and the shore reef. It breaks only in very rough weather.

A reef with $3\frac{3}{4}$ fathoms lies about one mile north-westward of Langi village, with one of $4\frac{1}{2}$ fathoms at three-quarters of a mile south-west of it.

- 20 A patch of $3\frac{3}{4}$ fathoms lies 18° true, distant $2\frac{1}{2}$ miles, from Ujong Araman at about one mile off-shore.

Islets.—Shoals.—To the northward of Simalandan bay and Telok Pau, lying off the coast, are three islets named Alahulu (Alahulu), Tapir (Tepi), and Penju (Ina), completely overgrown with vegetation.

- 25 A shoal of $4\frac{3}{4}$ fathoms is situated one mile, 255° true, from Tapir, and one of 5 fathoms at three-quarters of a mile, 270° true, from Alahulu.

Pulo Penju and its shoals are referred to with Tanjong Liwa.

Vessels should pass well to the westward of these islands and shoals.

- 30 **PULO SA LAUT** (Kokos islands of the Dutch) (*Lat. $2^\circ 59' N.$, Long. $95^\circ 23' E.$*) are two islands, overgrown with tall trees, lying about 20 miles westward from Ujong Liwa; they may be seen from a distance of 13 miles. Sa Laut Besar, the larger island, is about 2 miles in length in a north-west and south-east direction, and $1\frac{1}{2}$ miles in breadth; Sa Laut Kechil, the smaller island, is about half a mile in diameter, and situated $1\frac{1}{2}$ miles northward of Sa Laut Besar. They are connected with Simalur by a bank with depths under 20 fathoms, on which are the outlying banks mentioned on page 419, having a breadth; Sa Laut Kechil, the smaller island, is about half a mile in
- 35 The islands are uninhabited during the westerly monsoon period, but people from Simalur come to the larger island during the easterly monsoon, so that a few buildings may be seen on the eastern side of the island.
- 40

General chart 2760.

Plan of Simalur island on 2201. Var. nil.

Dangers.—Southward of Sa Laut Besar, breakers were seen extending for a distance of a mile from the island, and the 5-fathoms contour line extends 14 miles off.

A patch of 5 fathoms is charted 75° true, distant $3\frac{1}{2}$ miles, and one of $4\frac{1}{2}$ fathoms, 36° true, $2\frac{1}{2}$ miles from the south point of Sa Laut Besar.

Shallow water extends one mile south-eastward of Sa Laut Kechil and a quarter of a mile north-eastward of it.

Caution.—Several patches of 6 and 7 fathoms are charted between these islands and Pulo Simalur, and there may be less water, as before mentioned. See page 419.

Anchorage may be obtained, in 8 fathoms water, south-eastward of Sa Laut Kechil, avoiding the patch of $4\frac{1}{2}$ fathoms.

Chart 2760, Acheh head to Chingkuk bay.

PULO TAKAP (Tapah) OR FLAT ISLANDS (*Lat. $2^\circ 10'$ N., Long. $96^\circ 40'$ E.*) lie 14 miles south-eastward of Pulo Simalur, the northern island being named Babu or Lassia and the southern Russian or Babi; they are bold to approach apparently, in most places.

The northern island is about $2\frac{3}{4}$ miles long, and the southern $4\frac{1}{2}$ miles, the channel between them being $1\frac{1}{2}$ miles broad.

These islands are reported to be situated from one to 2 miles westward of their charted position.

Suffolk reef, composed of coral, with a depth of $2\frac{1}{2}$ fathoms, and seen by a vessel of that name, is charted $1\frac{1}{2}$ miles north-east of the north point of Babu island. It is about half a mile in length, and situated on the south end of a bank which extends about 6 miles in a north-north-west direction from it, with a breadth of about 3 miles; it is possible that there are less depths between it and Babu island.

A patch of 6 fathoms is charted at $1\frac{1}{2}$ miles off the north side of Babu; and a reef with less than 3 fathoms extends $1\frac{1}{2}$ miles off the south-east side of Russian.

The bight on the north side of Russian is known at Telok Atjeh; it is foul, and affords no good anchorage.

Bank.—At about 20 miles, 26° true, from Pulo Babu or Lassia, the Netherlands vessel of war *Benkulen* found, in 1894, a bank with depths of 10 fathoms, half a mile westward of which the depths were 17 to 20 fathoms.

The BANJAK ISLANDS are described at pages 338-342.

PULO NIAS.—**General remarks.**—Pulo Nias, the largest of the islands off the west coast of Sumatra, is 68 miles in length in a

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

north-west and south-east direction, and from 18 to 27 miles in breadth, separated from the Banjak islands by Pulo Nias north channel, 28 miles in breadth.

5 Nias forms a province with Tapanuli.

Aspect.—Pulo Nias is a hilly island which from the eastward appears like a chain of mountains of varying height. It has hardly any conspicuous peaks, but Gunong Mojeia (*Maziaja*), 1,417 feet high, in the northern portion, is noticeable, and is coffin-shaped, with three
10 somewhat lower peaks. The highest mountain is the slightly cone-shaped Lelematsjua, called by the inhabitants on the east coast Onomojo, 2,907 feet high, which rises in the southerly portion of the island, in the centre of other peaks of a nearly similar height.

In clear weather the high mountainous land of Sumatra can be
15 made out from near Gunong Sitoli, at the north-east end of Nias.

From the westward the hilltops along the coast are seen to better advantage, and afford good landmarks in conjunction with the islands fronting the coast. *See* views abreast.

Active or quiescent volcanoes do not exist in Pulo Nias as far as is
20 known, although many earthquakes occur there. In 1904 there were three tidal waves after a severe earthquake on the north-east coast, causing great destruction to the islands near by, and almost completely destroying Wunga.

Nias has numerous streams, but they are of little use to shipping;
25 the largest is the Muzej, which flows through the north part of the island and discharges on the north coast; only sampans can enter them.

The coasts are either rocky or fringed by sandy beaches; cocoanut plantations, miles in length, are to be seen on its south and east coasts.
30 Valuable timber is found in places. Roads have been made in recent years, and most of the larger villages are so connected.

Coal is found, but it is of too inferior quality to pay for working; iron and copper exists, but not to any extent.

Trade.—Population.—The population is estimated at about
35 100,000. South and Central Nias are the most densely populated. Malaria, dysentery, and fever made heavy ravages in 1910: 10 per cent. of the population succumbed. The swarms of mosquitoes assist in spreading malaria.

The Nias language is spoken in different dialects all over the island.
40 Malay is used only at Gunong Sitoli, the principal town, and at those spots where Malays have settled. Since the Dutch Government was established on the island in 1908, wars between the villages have been punished by executions, and feuds have become rarer in consequence.

General chart 2760.

Off-lying islands. Views of Simalur island and Pulo Nias.

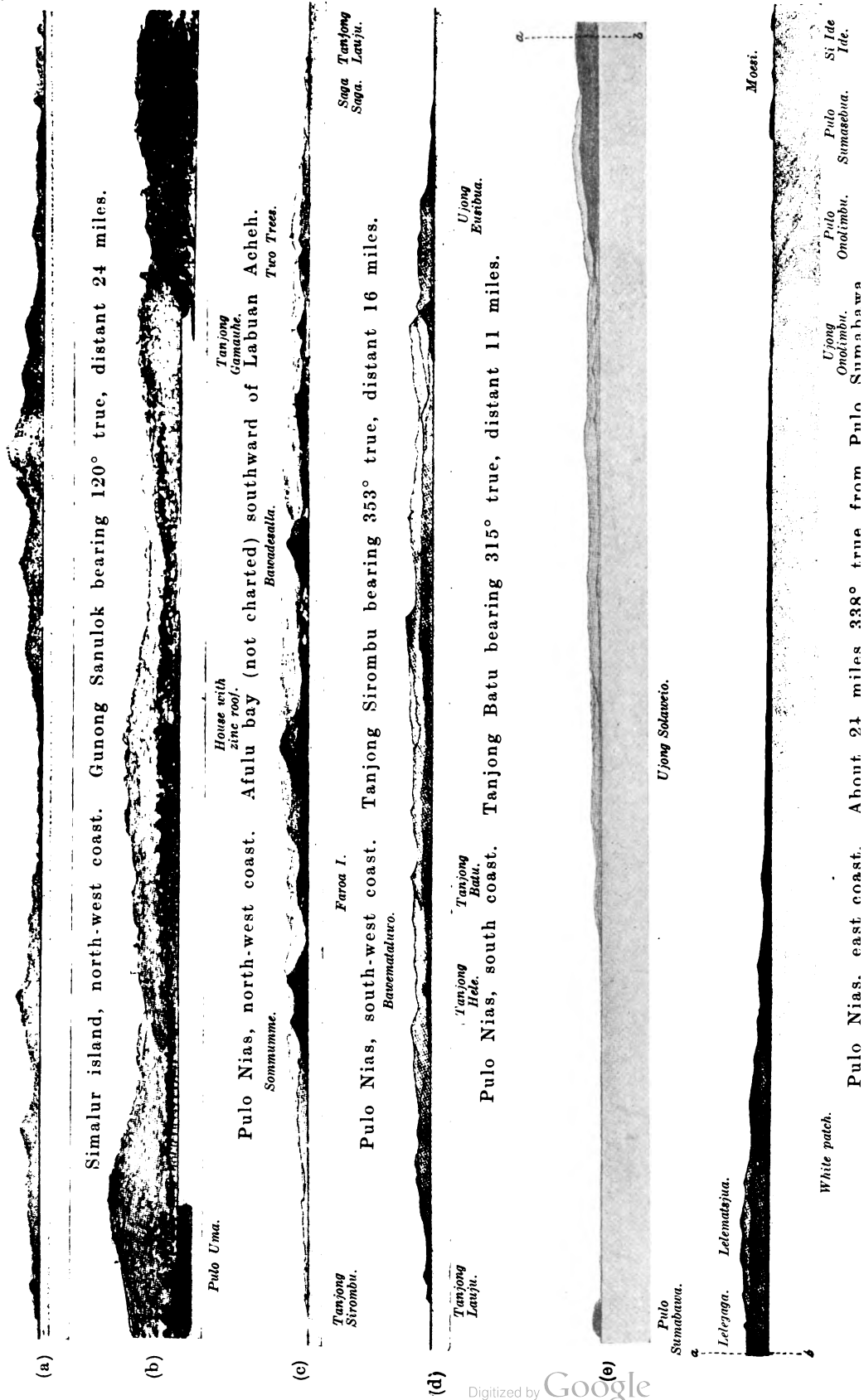


Chart 2760, Aceh head to Chingkok bay. Var. nil.

The villages are usually built on hills, many of them are but a few houses, but in the south they are much larger, and sometimes include 200 houses, and surrounded by a wall which can only be entered by two or three gates. The natives are not allowed to carry arms. 5

Productions.—The people eat rice, sago, maize, cocoanuts, pisang, and some kinds of plants; poultry and pigs are only eaten on rare occasions, but otherwise they all eat any flesh they can procure.

Boats are only seen where there are Malays, as the Nias tribes are not a seafaring race. Copra is exported, and in smaller quantities, 10 nutmeg, and mother-of-pearl: the imports are rice in large quantities, cotton goods, timber, iron, and earthenware.

Trade is done with the Malay settlers along the coast and with Padang, Singapore, and Penang.

Communication.—Transport is effected by the Netherlands 15 Mail Packet Company. See page 434.

Climate.—The monsoons conform with those on the west coast of Sumatra, but the following observations were made in 1910-11, during the survey of the island.

Bad weather prevails in November; north and north-westerly squalls 20 accompanied by heavy rain made the survey of the coast impracticable for days on end.

In October, heavy south and westerly winds with rain occurred on the north and north-east coasts. North-north-west and north-westerly winds and rain prevailed on the east coast for several days at a time 25 during June. The weather was better in July, August, and September, although a great deal of rain fell, particularly with squalls from north, west, and south-west. The climate is much better on the east than on the west coast, as the heavy gales of the westerly monsoon are broken by the island. 30

The south-westerly ocean swell breaks heavily on the south and south-east coasts as far up as Sjuani on the east coast. During the westerly monsoon landing is very dangerous on the open coast even in calms after days of fair weather, as the ocean swell, although exhausted, still breaks with great force against the steep beaches. Fine 35 weather is generally found on the west coast from December until the middle of May, but moderate surf on the beaches continues even when the sea is quite calm.

March sometimes brought strong south-east winds and heavy rain. In the latter part of May south-west winds were prevalent, accom- 40 panied by high breakers, and the weather was mainly stormy. The island is chilly owing to the constant rain and the land wind, which continues during the night in good weather on all the coasts and blows down from the hills and mountains. In November the morning tem-

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. nil.

perature is about 75° , and does not rise much above 80° Fahr. Severe thunderstorms do not occur.

- Tides.**—In Telok Dalam, on south coast, both systems occur, with
5 a predominant double-daily character.

Double-daily springs occur 2 days after full and new moon, with high water at 7h., and a rise of 2 feet. Neaps occur the same time after quadrature, with high water at 1h., and a rise of less than one foot.

- 10 Single-daily high water occurs 1st January 5h. p.m., 1st April 11h. a.m., 1st July 5h. a.m., 1st October at midnight. Springs occur on the day of the moon's maximum declination, with a rise of one foot. Neaps, when declination is nil, have no perceptible rise.

- At Gunong Sitoli, north-east coast, the tide is almost of an exclu-
15 sively double-daily character. Springs occur $1\frac{1}{2}$ days after full and new moon, with high water at VIh. and a rise of 2 feet; neap rise is scarcely perceptible.

- Tidal streams** are weak around the island; they never exceed three-quarters of a knot, and most of it may be attributed to the pre-
20 vailing wind. Off Tanjong Lojang, the north extreme of the island, a set of $1\frac{1}{2}$ knots north-westward is sometimes experienced, but usually the set on the coast is but trifling.

- PULO BABU or Sarangbau (Sarangbung)**
(*Lat. $1^{\circ} 40' N.$, Long. $97^{\circ} 25' E.$*) lies 10 miles northward of the north
25 extreme of Pulo Nias, has a reef extending about a mile north-west of it, and 3 cables from its south point. There is a break in the reef on the south-east side where boats can land, and a village of about 20 houses.

- There is anchorage on this side in 29 fathoms, over sand, protected
30 from north-westerly squalls.

- PULO NIAS, north coast.—Aspect.**—The north coast of the island is a low expanse bounded on the east by a range of hills which stretches inland from Tanjong Lojang to the Gunong Mojeia (*Maxiaja*), 1,417 feet in height, described as being shaped like a coffin. Near it
35 are the pointed hills Gui Gui, 1,315 feet high, and the somewhat lower peaks Sobagole and Lambi, 1,119 feet high. Westward of these is Simalaj, 663 feet high, only visible on the north coast. See views *b*, *c*, *d*, on page 433.

- Tanjong Lojang (Si Gini Gini)** (*Lat. $1^{\circ} 32' N.$, Long. $97^{\circ} 20' E.$*), the north extreme of Pulo Nias, is low and thickly wooded and fairly steep to beyond its fringing reef. A continuous grove of cocoanut trees extends westward from it to Sifahandro village.

Sungi Muzeu discharges into the bay at about $4\frac{1}{2}$ miles southward of Tanjong Lojang; it is the largest river or stream in Pulo Nias,

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

but is difficult to distinguish at any distance. Close in it will be seen, and also the cocoanut trees at the village of Muzeuj Ilir. A wide sand and mud bank fronts the mouth, and with a northerly wind rollers break on its bar. Banks, which dry, extend from both sides for a distance of one to $1\frac{1}{2}$ cables; the water deepens suddenly from $2\frac{1}{2}$ fathoms to 12 to 17 fathoms. 5

Small steam craft can enter at high water when the wind is off-shore, and ascend as far as the Sungi Ehue, from which a good track leads to Gunong Maziaja, a 4 hours' journey. The country is but sparsely inhabited, but is very fertile, and everywhere covered with hard wood. Cocoanuts are exported. 10

LAPAU BAY, a large bight in the north coast of Nias, lies between Tanjong Lojang on the east, and Tanjong Tanah Nasie on the west, and contains several islets and reefs; its western part is known as Simanari bay. Pulo Panjang (Sinau) is the largest island and farthest off-shore, and westward of it is Goso Uma, with shrubs growing on it. 15

Light.—A light is exhibited on Goso Baohi, in Lapau bay, on a white iron framework, 69 feet high, in about lat. $1^{\circ} 26' N.$, long. $97^{\circ} 10' E.$ 20

Reefs.—A reef, which breaks, lies about 3 cables off the west and north-west sides of Pulo Panjang.

Three reefs, with depths of from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms, are situated at from one to 2 miles north-westward of this island. 25

Anjuno, a reef, with a depth of 4 feet, is situated midway between Pulo Lapau (Lafau) and Pulo Bangkora.

Gosong Ombang (Goso Uma).—About one mile westward of Pulo Panjang is Gosong Ombang, an islet surrounded by a coral reef which breaks 30

Pulo Bangkora (Makora) and Pulo Lapau (Lafau) are situated about one mile and 2 miles respectively, south-westward of Pulo Panjang, and between the two first-named islands is Arjuno, a coral reef, with a depth of 3 feet, from which the west point of Pulo Bangkora bears 26° true, and the east point of Pulo Lapau, 178° true. 35

The eastern part of the bay is quite exposed to north and north-west squalls which are particularly severe from October to December.

Anchorage.—A village is situated on the south-east part of Pulo Lapau, and the inhabitants do some trade with Gunung Sitoli. Secure anchorage may be obtained off the village in a depth of 26 fathoms, over blue clay, with the east point of the island bearing 17° true, or anchorage may be taken closer to the island, in depths of 15 to 17 fathoms, over sand and mud. 40

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Simanari bay lies in the western portion of Lapau bay. It is entered by a passage about 330 yards wide between Goo and Terho. It has three bights, of which the east and south-east are of no value to shipping, but the south one affords good shelter for three small craft under any conditions.

High winds and swell are hardly felt in this bight, so that landing and unloading can always be effected. The western side of the bay is covered with cocoanut trees, whilst the western is mangrove.

- 10 **Simanari village** lies on the south-west side of the bay; the Government representative for North Nias resides here. Chinese and Malay traders chiefly inhabit the village, exporting nutmeg and copra, and importing tea and manufactured goods. There is a long wooden pier for boats and praus.

- 15 **Directions.**—Praus and other coasting vessels navigate inshore of the reefs on the east side of Pulo Nias when proceeding from or to Telok Dalam, or places in that neighbourhood, but without a larger scale chart it would be useless to offer any directions.

- WEST COAST.**—Tanjong Lebang (Tojolawa) (*Lat. 1° 23' N., Long. 97° 4½' E.*) is about 5 miles south-westward of Tanjong Tanah Nasie, and from it the coast trends to the southward for about the same distance to Labuan Acheh.

- Goso Tanah Nasie, a reef, 3 cables in length, about half a cable in breadth, which has 2 feet least water and breaks, lies 338° true, distant 1½ miles, from Tanjong Tanah Nasie.

Labuan Acheh affords anchorage, in 10 to 12 fathoms, sheltered from northerly winds, and but little inconvenienced by the heavy swell. There is a patch of 3 fathoms on the eastern side.

- At 12 miles south-eastward of Labuan Acheh is Afulu bay. It lies between Pulo Uma and the heavily-overgrown Tanjong Gamauhe, and is only available for small craft, in depths of 4 to 5 fathoms. View *b* on page 422.

Pulo Musei (Mausi) lies southward of Labuan Acheh; a shoal with 4½ fathoms is situated 200° true, distant 3 miles, from the island.

- 35 **Pulo Bunga (Wunga)** is an atoll on a reef nearly 5 miles in length north and south and nearly 4 miles off the coast abreast.

A shoal, indicated by discolouration of water, is reported (1910) to be situated 3 miles westward of the northern of these islands; others may exist.

- 40 **Merapi reef**, with a depth of 5 fathoms, and showing discoloured water, is about a mile in extent and lies with the south extreme of Pulo Bunga bearing 310° true, distant 6½ miles.

General chart 2760.

Plan of Naku anchorage on 2284.

NAKU (Hinako) ISLANDS (*Lat. 0° 50' N., Long. 97° 21' E.*).

—These form a group of eight islands, of which Naku (Hinako) is the most populated. They are all of coral formation, covered with cocoa-nut trees, and are all flat, with the exception of Naku, which has a hillock on its west side, on which is a mission church and school. The population of the group amounts to about 1,800, about 300 of whom were Christians, in 1911. There are Malay and Chinese traders on the islands, who buy the copra and ship it to Padang and Penang. Neither provisions nor good water are obtainable on the islands. Rice and other foods, cotton goods, &c., are imported. Landing is not easy on account of the shore boulders.

LIGHT.—On Naku (Hinako) island, from a white iron framework, 105 feet in height, a light is exhibited, at an elevation of 180 feet above high water.

Anchorage.—There is good anchorage in from 18 to 20 fathoms, mud and sand bottom, south of Naku village, at about 3 cables outside the 10-fathoms contour line, with the south point of Naku bearing 259° true, and the north-east point 25° true, fairly sheltered.

Directions.—Entrances.—The passage between Naku and Langu is available from the northward, keeping close over to Naku island coast reef. From the southward, that between Sendrongan (Bawa) and Mangit (Bugi), keeping towards Sendrongan, which should be approached with Pulo Bindala bearing eastward of 0° true, to avoid Gosong Pinang (with a least depth of $2\frac{3}{4}$ fathoms and about 2 miles in length, and which breaks), situated $1\frac{1}{2}$ miles, 135° true, from Pulo Bindala (Hamulala); thence in the fairway between the two islands, heading for the western tall house with zinc roof in Naku village.

The passage between Simanang (Imana) and Naku and that between Mangit and Bindala are blocked by reefs. A patch of $1\frac{1}{2}$ fathoms lies half a mile northward of the west end of Simanang, and a rock with less than 6 feet water at $3\frac{1}{2}$ cables eastward of the east extreme of that island.

The drying reef off the north side of Mangit (Bugi) can usually be recognised by a large black boulder, which is just submerged at high water. There is a reef between it and Langu. For others *see* the plan.

Vessels passing westward of the islands should give them a berth of one mile or more, where the water is deep.

Chart 2760, Acheh head to Chingkuk bay.

COAST.—Serombi (Sirombu) roadstead.—Ujong Serombu (*Lat. 0° 57' N., Long. 97° 26' E.*) is situated 4 miles, 20° true, from Langu, the north-eastern of the Naku group; it is low, but

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. nil.

covered with cocoanut palms with some higher casuarina trees, which render the point visible from some distance. South-eastward of the point are two islands named Pulo Siite and Pulo Lawanda (Lawandra), with cocoanut palms. On the north-east side there is a village, and at its west point a conspicuous tree; Pulo Lawanda is a sand cay, thickly wooded. The Sungi Baula runs into the sea on the north-east side of the bay, northward of the islands; its bar sometimes breaks.

- 10 **Reef.**—A reef, about $2\frac{3}{4}$ cables in extent, with 3 feet water, and marked by breakers, is reported to be situated about three-quarters of a mile southward of Pulo Lawanda. Several patches of $1\frac{1}{2}$ to 3 fathoms lie 4 miles north-westward of Ujong Serombu.

- 15 **Anchorage** may be obtained between Pulo Siite and the river mouth, in a depth of 7 fathoms, over mud, with Ujong Serombu bearing 256° true and the north point of Pulo Siite 133° true.

- Vessels will lie protected from northerly winds, but exposed to the south-west. A vessel lying here labours heavily at her anchor as she swings broadside on, so that it is better to lie between Pulo Siite and the shore in depths of $6\frac{1}{2}$ fathoms, mud bottom. Landing can usually be effected within Ujong Serombu. The place is most unhealthy, but some trade in copra is done. No supplies are obtainable.

- Aspect.**—The west coast of Pulo Nias, south of Ujong Serombu, is high everywhere; the hilly land extends down to the coast at nearly all points. There are some conspicuous peaks, but they are not yet charted on 2,760. Somumme, 1,926 feet high, has a wide top and is equally visible from northward or southward of Serombu. The cone-shaped Salawaahi, 1,555 feet high, and the cone-shaped summit Silealo to the north of it is also a good landmark. The highest apparently is Dao Dao, 2,192 feet high. Bawedesulle, 1,240 feet high, immediately over the coast, is cone-shaped, and conspicuous. Sisambalaha is another similar hill, 1,814 feet high, further southward, easily identified from the north-westward, but is not so conspicuous from the southward as it does not stand out against the high land in the interior. See views *c* and *d*, on page 422.

The coast itself, particularly in the morning, is hidden from sight by mist from the spray caused by the surf, and landing is impossible during the greater part of the year, as before mentioned.

- Somo Somo (Ujong Soahebuhu), the south-west point of Nias, rises gradually to Saga Saga summit, 361 feet high; a black rock lies near the shore. Two large trees, 1,174 feet above sea level, are very conspicuous on the north side of a chain of hills inland to the northward of Bawemataloewo village, 971 feet above the sea, and can be seen from a considerable distance to the westward, and sometimes to the

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

northward of the Naku islands. This village or town is the largest in the island, with a population of about 3,000, 500 of whom are warriors whose weapons are slings.

Coast.—The rocky overgrown Pulo Foroa (Faroa), charted in lat. $0^{\circ} 46' N.$, stands out darkly against the coast. There are numerous rocks above water in its neighbourhood, but Foroa, and Rii, a rock 207 feet high, joined to the coast by a ledge which dries, are the only ones with any vegetation. 5

At about $2\frac{1}{2}$ cables south-west from Tanjong Ichu, not charted, there is a reef which dries, and usually discernible by breakers. Others lie near the shore and are easily seen. No reefs were found off-shore during the survey, so that the south-west coast of Nias as far northward as the Naku islands may be considered as the safest in that respect of all the coast of Nias. There is convenient anchorage along this coast during the easterly monsoon season, but high seas are experienced here during the westerly monsoon period. 15

SOUTH COAST.—At the south end of Pulo Nias there are three bays named Telok Luagundi, Pohili, and Dalam. See views *c* and *d* on page 422. 20

Depths of from 6 to 7 fathoms are reported at from one mile to 2 miles from the shore, between Telok Luagundi and Telok Dalam.

Plan of Telok Luagundi on 2284.

Telok Luagundi (Lagundi) (*Lat. $0^{\circ} 34' N.$, Long. $97^{\circ} 44' E.$*) is about a mile in length, north and south, with depths of 6 to 7 fathoms. Its shores are covered with cocoanut trees, and there is a sandy beach at its head which will identify it from the offing, and which is free from rocks, affording good landing; elsewhere the shores are fronted by reef to the distance of one to 2 cables. 25

Dangers.—Batu Burung (Ito) is an overgrown rock situated close to the east point of the entrance; Batu Mandi, a large black rock, lies about 3 cables southward of the east point, and is a good mark. 30

A rock, which dries, lies 2 cables westward of the same point, and must be given a wide berth.

Tanjong Lauju, on the west side of the entrance, has reef, with a depth of $4\frac{1}{2}$ fathoms on its extreme at 6 cables south-east of it. 35

Anchorage.—The best position is in 6 to 7 fathoms, mud and sand, with the entrance points bearing 170° true and 218° true. It is quite open to south and south-westerly winds and swell, which sometimes extend well up the bay. 40

Directions.—Entering the bay, Batu Mandi should be given a good berth to avoid the rock which lies at 2 cables outside it. From the westward, Batu Mandi should be kept bearing northward of 90° to

General chart 2760.

Plan of Telok Luagun di on 2284. Var. nil.

avoid the reef off the western approach to the entrance, until about half a mile from it, when a course 43° true for Amaitaniha village, on the high land on the east side of the bay, should be steered; when
 5 Batu Burung bears 164° true, a north course may be steered for the anchorage.

Villages.—Lagundi lies northward of the sandy beach at the head of the bay, and Amaitaniha village on the hills on the eastern side. Hilibotodane lies on the western hills, and the roofs of some of
 10 the houses are visible in certain places in the bay. The cocoanut trees around Bawemataloewo, the largest town of Nias (page 428), 2 hours distant, are visible from the bay. There are good roads or tracks leading to the several villages.

Chart 2760, Acheh head to Chingkuk bay.

15 **Telok Pohili (Tohili)**, eastward of Telok Luagundi, is shallow and inaccessible owing to the reefs fronting the shore nearly closing the entrance, and which is always covered by heavy breakers; Telok Gosi is similar. Vessels passing these should give the coast a berth of 2 miles on account of patches of 5 and 4 fathoms, which lie a little
 20 over a mile from the shore.

Plan of Telok Dalam on 2284.

Telok Dalam (Lat. $0^{\circ} 33' N.$, Long. $97^{\circ} 50' E.$) is about a mile in length, affording good shelter from all but south-east winds, which, however, do not cause much swell, and is free from dangers.

25 It is easily recognised by Tanjong Batu, the north point of the entrance, which is dark, nearly perpendicular, and 315 feet high, and has but little reef fronting it. Tanjong Telok Dalam (Hele), the south point of the entrance, is fairly high, with cocoanut trees; it is fronted by reef which breaks, and extends for three-quarters of a mile south-east of the point.
 30

A patch of 4 fathoms lies $1\frac{1}{2}$ miles south-west of the point. A spit with from 2 to 5 fathoms extends 6 cables north-eastward of the point. (*Chart 2760.*)

The coast is low at the head of the bay, and the whole is covered
 35 with cocoanut trees.

Anchorage.—There is good anchorage in 10 fathoms, over mud and sand, at 2 cables off the pier; small vessels in 7 to 8 fathoms at a cable off-shore.

Directions.—Vessels should steer up the centre of the bay on a
 40 297° true course, passing about 2 cables off Tanjong Batu, to the anchorage.

Tides.—The tides correspond with Ayer Bangies (page 366). The streams are weak.

General chart 2760.

Plan of Telok Dalam on 2284. Var. nil.

Pier.—There is a pier with a depth of 7 to 8 feet at its end, used by the trading craft. Telok Dalam is connected by telephone with Gunong Sitoli on the east coast and with the interior.

The military encampment and the residence of the Governor of South Nias is nearer the head of the bay. A steep stony track leads to Bawemataloewo village, situated on a hill about 700 yards to the north-westward.

Chart 2760, Aceh head to Chingkok bay.

EAST COAST.—The east coast of Pulo Nias has moderate depths, with good anchorage, and some streams, where trade is carried on in native craft; islets and reefs front the coast here, as on the western side; but the sea being smoother on the eastern coast renders it safer. *See* views on pages 422, 433.

Ujong Majinga (Tedu Ichu) (*Lat. 0°40' N., Long. 97°57' E.*).—From Telok Dalam the coast trends north-eastward for about 10 miles to Ujong Majinga, covered with cocoanut trees, and with a number of villages scattered about between them. The high land approaches the coast generally. A narrow reef fronts the shore preventing loading in most places, but boats may do so near the villages of Telok Walo and at Bawezaua, 3 miles south-westward of Majinga.

Anchorage.—With southerly winds there is quiet anchorage north of Majinga.

Reef.—The coast may be fairly closely approached, and is quite clear, with the exception of a shoal near the shore, with a depth of 4 fathoms, situated 65° true, distant 2 miles from the entrance of Telok Dalam.

Coast.—Between Ujong Majinga (Tedu Ichu) and Ujong Sumbawa (Sumabawa) the coast is high, with mountain ranges approaching the shore, especially at Ujong Baleika (Hilialawa), 4 miles northward of Majinga. A reef commences here which extends a mile off in places as far as Ujong Sumbawa. The coast reef is broken in places, so that boats can easily land on the sloping beaches. The Sungi Baleika (Balega) furnishes good water, but its mouth is obstructed by a reef. The high road leads inland through the Masio valley.

Ujong Sumbawa (Sumabawa).—Aspect.—Near Ujong Sumbawa, which is low, attention is attracted to a conspicuous mountain cleft in the background; the cone-shaped Lelegala mountain, 1,634 feet high, forms one of the most conspicuous features of the district, together with a noticeable white patch north-east of it.

Between Ujong Sumbawa and Ujong Chaunie (Siuana), 7 miles to the northward, a broad bank of mud, on which the depths are

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

under 3 fathoms, extends 4 miles off the coast; nearly the whole of the east coast is similarly fronted and always covered with breakers. An extensive plain begins here and extends north-westward, finally becoming 8 miles wide at Ujong Lambaru. The coast consists of sandy beaches with boulders. Surf nearly always renders landing difficult, and this can only be effected at a point 8 cables northward of Sumbawa. The Sungai Susua discharges into the bay between Ujong Sumbawa and Ujong Chaunie; its valley is densely populated.

- 10 **Pulo Sumbawa** (Sumabawa) (*Lat. $0^{\circ} 55' N.$, Long. $98^{\circ} 3' E.$*) lies about 5 miles south-eastward of Ujong Chaunie; it is surrounded by a narrow reef, and is visible from a distance of about 13 miles. See view *c* on page 422, and those of the coast abreast on page 433.

- 15 **A patch** of $3\frac{1}{2}$ fathoms lies 2 miles north-westward of Pulo Sumbawa.

Macassar reefs are two heads of $2\frac{1}{2}$ and $3\frac{1}{4}$ fathoms, close together, situated 2 miles southward of Pulo Sumbawa.

- 20 Three reefs are situated southward of Macassar reefs at about $3\frac{1}{2}$ miles from the coast; the northern, with a depth of $1\frac{3}{4}$ fathoms, at 5 miles southward of Pulo Sumbawa; the centre of $4\frac{1}{2}$ fathoms at 7 miles southward of that island, and the southern of 3 fathoms at Argo, 4 miles north-eastward of Majinga.

- 25 **Sama Sama (Suma) islands** lie about 2 miles off-shore between Tanjong Chaunie and Gunung Lembu (Ujong Onolimbu), abreast the river of same name, and between them and the coast is a shoal lying 7 cables off the shore, 250° true, distant one mile from the western island.

- 30 Sumasebua, the inner island, is covered with cocoanut trees, and is distinguishable by a large tree situated on its summit, 72 feet above high water. There are several people on the island

Si Ide Ide, the outer island, is thickly overgrown, but has no cocoanut trees.

- 35 A reef with a sandbank on it lies 40° true, distant one mile, from Si Ide Ide.

Patches of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms lie $1\frac{1}{2}$ and 2 miles south-eastward of Si Ide Ide. For others, see the chart.

- 40 **Gunung Lembu (Ujong Onolimbu)** (*Lat. $1^{\circ} 1' N.$, Long. $97^{\circ} 56' E.$*) lies north-west of the Sama Sama islands; it is low, and has a reef extending one mile north-north-east of it.

- There is good anchorage in the roadstead within or westward of the point, in depths of 12 to 14 fathoms, mud bottom, where vessels can anchor close to the shore, abreast a road which leads through Tagaule village to Bawalia. Fishing boats run ashore on the beach where there are sheds for them. The natives here understand a little

General chart 2760.

Views of Pulo Nias—continued.

Sama Sama.

Gunong Lembu,
188° true.

(a)

Gunong
Lembu Kethil,
118° true.

Gunong Lembu Gadang.

Tanjong
Gunong Lembu,
140° true.

Pulo Nias, east coast. Tanjong Gunong Lembu, and adjacent islands.

Gunong
Sutah.

Mojeria
(Maziaja).
Gui
Gui.

(b)

Tanjong
Mband.

Tanjong
Sovu.

Tanjong
Lacha.

Casuarina
Wood.

Tanjong
Laja.

Tanjong
Dowi.

Pulo Nias, north-east coast. Gunong Gui Gui bearing 253° true distant 12 miles.

Mojeria
(Maziaja).

Sommumme.

(c)

Tanjong Si
Gini Gini.

Senau.

Makera. Goso
Uma.

Tanjong
Goo.

Tojodawa.

Pulo Nias, north coast. Tanjong Si Gini Gini (west of Lojang) bearing 100° true, distant 13 miles.

Mojeria.

(d)

Tanjong
Laja.

Tanjong
Lojang.

Pulo Nias, north coast. Tanjong Lojang bearing 225° true, distant 4 miles.

Tanjong
Tanah Nasi.

Chart 2760, Aceh head to Chingkok bay. Var. nil.

Malay, owing to their trading with Gunong Sitoli. This roadstead is only available by those acquainted with it, failing a chart showing the islets and dangers in it. There is another similar anchorage off Bodsjhona village, to the northward. 5

Lembu (Onolimbu) islands consist of Gunung Lembu Gadang (Onolimbu) and Gunung Lembu Kechil (Musi); the former $1\frac{1}{10}$ miles northward, and latter 2 miles north-eastward, of the point of same name.

Between the islands and north of Gunung Lembu Gadang there is a clear channel, but rocky patches which break extend from one to 3 miles westward of the islands. 10

Senduta reef (Gosong Sandruta), north-west of the preceding, has a depth of 3 feet, and lies with Tanjong Lembaru bearing 325° true, distant about $2\frac{1}{2}$ miles. 15

Directions.—Vessels with local knowledge navigate along the coast, from off Telok Dalam to Gunung Lembu (Onolimbu) roadstead, inshore of the islands and reefs just described, and from thence northward to Gunong Sitoli, but with the present small scale chart it is not advisable to furnish the directions that have been written for it. 20

Tanjong Lembaru (Lambaru) (*Lat. $1^\circ 11' N.$, Long. $97^\circ 51' E.$*), situated at the north end of the channel within the islands and reefs to the southward, is heavily overgrown, and may be recognised by a dead tree standing in the water; the coast is very marshy hereabouts. 25

Aspect.—Between Lembaru and Gunong Sitoli, at about 18 miles to the north-westward, the coast forms a rather deep bight; at its head the hills approach the shore leaving only a narrow strip of low land between them. The ridge of hills offers a few conspicuous features. The highest part, 895 feet, Gunong Naija, lies close to the fairly steep southern slope of the ridge. The mountain Bawējuho, 1,560 feet high, is pointed and very conspicuous, but it disappears behind the high land in front of it when near the coast. The cone-shaped summit Lelegaga, 1,634 feet high, and a round summit north-west of it, form the best marks. The points projecting into the bay are mostly low and covered with trees, but Tanjong Fodo is fairly high, and with a good light shows its red and white cliffs. *See views abreast.* 30 35

The shore mudbanks front the shore to a distance of a quarter of a mile off the mouths of the Gide Sebua and Gide Siide, and round Tanjong Ndra, dropping suddenly from $1\frac{1}{2}$ fathoms to 17 to 18 fathoms. In places the coast is fronted by sandy beach with boulders. 40

Anchorage.—There is anchorage off Foa village, in 11 fathoms, at 3 cables off-shore; the village is not visible, but the place can be

General chart 2760.

Chart 2760, Achek head to Chingkuk bay. Var. nil.

recognised by the south end of a grove of cocoanut trees northward of it.

- GUNONG SITOLI** (*Lat. 1° 18' N., Long. 97° 36' E.*), the
 5 chief town of the island, is the seat of government, which is represented
 by a Controller who is also the Harbour master. It lies mainly on the
 left bank of the Sungi Noh, a stream over which is an iron bridge. The
 settlement has good well-kept roads, a church for Christians and Nias
 people, and a mosque for Mahomedans. It can be made out from
 10 some distance by the glitter of the zinc roofs of the Chinese warehouses.
 Good roads run from here to the south-west and north ends of the
 island, and the settlement is connected with the interior as well as
 with Telok Dalam, by telephone. *See view b on page 433.*

- The roadstead** is sheltered from westerly and south-westerly
 15 winds, but to all winds from north to south-east it is completely
 exposed, so that a considerable sea can get up in it. The shore is very
 steep, and vessels cannot lie at anchor with any security. It is best
 to anchor in 20 to 22 fathoms, mud bottom, with the barracks bearing
 185° true; this latter is a conspicuous dark grey-tiled building. Vessels
 20 here will be a quarter of a mile from the shore, and one cable outside
 the 10-fathoms contour line, close to the new wharf.

- The old wharf can be used in fine weather only; at other times the
 sea breaks at its head. When the mail steamer is expected lights are
 exhibited from the old pier flagstaff. When they are not exhibited
 25 it is difficult to make the roadstead, as all lights are put out after
 8 or 9 p.m.

The mouth of the river will just admit small trading craft at high
 water; it is always marked by surf.

- LIGHT.**—From a white iron framework a light is exhibited on
 30 the hill near Tanjong Mbao, at a height of 249 feet above high water,
 northward of the roadstead. *See Light list.*

Communication.—The Netherlands Royal Packet Company's
 steamers, running between Padang, Penang, and Singapore, call
 every four weeks.

- Supplies** of provisions and drinking water are only obtainable
 35 in small quantities.

Tides.—The tides are inconsiderable. It is high water, full and
 change, at about VIIh; springs rise about 2 feet. *See also page 430.*

- COAST.**—The coast northward of Gunong Sitoli is quite covered
 40 with cocoanut trees as far northward as Tanjong Tambalau (Tambalo).
 Northward of the rocky point of Tanjong Mbao there is only a narrow
 strip of coast land, with hills within rising to a height of 676 to
 853 feet.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Telok Beluku (Lat. $1^{\circ} 34' N.$, Long. $97^{\circ} 32' E.$), between Tambalau and Sowu points, affords anchorage in 10 fathoms, abreast the mouth of Sungai Afia, in a deep hole, within the 5-fathoms contour line. There are no landmarks, but it may possibly be identified 5 by some cocoanut trees northward of the mouth of the stream. A fresh-water lake is situated just north of the river connected with it by a creek about 4 cables in length on the bar of which there is a depth of a few feet. The depths in the lake are from $6\frac{1}{2}$ to 9 fathoms.

Tanjong Tambalau (Tambalo) is low, and covered with 10 cocoanut trees. Tanjong Sobu (Sowu) is also low and covered with casuarina trees. A sandbank fronts the coast between the two points, and also the mouth of the Sungai Sowu, making it difficult for boats to enter.

Telok Lemake.—Goso Pasir, a drying coral reef, marked by 15 breakers, lies nearly a mile off Tanjong Laka (Lacha). Other reefs render the coast unsafe between the points mentioned. Tanjong Tobie (Dowi), open of Tanjong Laja, clears Goso Pasir.

Tanjong Laja (Laja) (Lat. $1^{\circ} 28' N.$, Long. $97^{\circ} 30' E.$) is the termination of the slope of Sumbalahe hill, 695 feet high. It is 20 covered with cocoanut trees, steep-to, and free from dangers.

Telok Fofola, westward of Tanjong Laja, is fringed by reef, and like the hills around is densely covered with brushwood. Cocoanut plantations are seen at the mouth of the Ladara, Fofola, and Fino streams near the villages of same names. 25

There is good anchorage in 12 fathoms, abreast Faru village.

Tanjong Tobie (Dowi), covered with cocoanut trees, is fronted by a reef to a distance of $1\frac{1}{2}$ cables, with depths of 3 fathoms at 3 cables from the point.

Plan of Siaba bay on 2284.

SIABA BAY (Lat. $1^{\circ} 30' N.$, Long. $97^{\circ} 24' E.$), the northernmost anchorage on the north-east coast of Pulo Nias, is about 2 miles wide between Tanjong Tobie (Dowi) and Tanjong Siaba (Ture Leusu), with depths of about 30 fathoms in its outer part, exposed to the 30 northward.

There are two harbours on its western side, Telok Siaba and Telok Limon Kippah (Sawaulu), with depths presumably as charted.

Goso Baah, about 2 cables in extent, with a depth of about 3 feet, is marked by discoloured water and sometimes breaks.

Anchorage.—There is anchorage, in a depth of 22 fathoms, 40 between the above reef and the peninsula known as Pulu Sawaulu, which is covered with cocoanut trees, with Siaba point bearing 325° true, distant 2 cables. Vessels can lie here in smooth water

General chart 2760.

Plan of Siaba bay on 2284. Var. nil.

during north-west and northerly winds when there is a heavy sea outside.

- 5 Pulo Ongeh (Unggi) is situated in the eastern part of the bay, fringed by reef. A sandbank fronts the Sungai Sawe, the entrance of which is marked by casuarina trees.

Tanjong Lajang (Si Gini Gini) is the north extreme of Pulo Nias. See page 424, and views *b*, *c*, and *d*, on page 433.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

- 10 **PULO NIAS GREAT CHANNEL** (Lat. $0^{\circ} 15' N.$, Long. $98^{\circ} 0' E.$), between Pulo Nias and the Batu islands, is about 37 miles across and safe with a good lookout, but caution is necessary when near any of the islands on either side during the night, as the dangers are but imperfectly known.

- 15 The fairway is deep, probably from 150 to 350 fathoms or more. The following banks have been found, and there may be others.

- Bank.**—A bank, with depths of 13 to 20 fathoms, extends 23 miles southward of Pulo Nias; depths of 13 and 18 fathoms have been obtained on this bank at 19 to 21 miles, respectively, southward of the south extreme of that island.

The bank has a varying width of from 8 to 11 miles within the 100-fathoms contour line.

Thornhill bank, with a least known depth of 18 fathoms, and steep-to, lies on the above bank, as charted.

- 25 **THE BATU ISLANDS.**—General remarks.—These islands lie on and near the equator in about long. $98\frac{1}{2}^{\circ} E.$ They consist of three large islands with several smaller ones, surrounded by numbers of extensive coral reefs, which appear to have given their name to the group of islands.

- 30 The large southernmost island, Tanah Bala, forms the north side of Siberut strait; the centremost, Tanah Masa, forms the south side of Pulo Nias Great channel, between it and Pulo Nias. The north-easternmost, Pulo Pini, lies between Tanah Masa and the coast of Sumatra.

- 35 In clear weather, the Ophir mountain and the Sidoa-doa range on Sumatra can be distinguished; Pulo Nias is visible from the northernmost island, and Pulo Siberut from the southernmost. See view *b* on page 356, *a* on 358, and *a* on 378.

- 40 **Population.**—There are about 10,000 inhabitants, mostly of Nias origin, and having their customs and habits. The rest of the population is Malay, and Bugunise (about 1,500), and Chinese traders.

There are but few people on the larger islands, and the most frequented are Tello and Sigata. Only about 20 of the smaller islands are inhabited.

General chart 2760.

Chart 2760, Acheh head to Chinguk bay. Var. $0\frac{1}{4}^{\circ}$ W.

The greater part of the islands is still uncultivated, only a small proportion is covered with cocoanut and sago palms; the best plantations are owned by Chinese.

Exports.—The principal exports are cocoanut oil and valuable woods, which are found on the island and used for shipbuilding; praus are also built. Other exported articles are camphor, copra, dried fish, tripang, and resin.

PULO SIMU (Simuk) (*Lat. $0^{\circ} 4' S.$, Long. $97^{\circ} 53' E.$*), the westernmost island of the Batu group, and situated 22 miles westward of Tello, is a small, low, triangular-shaped island, about $1\frac{1}{2}$ miles in length in an east and west direction; it is densely overgrown and has large trees on it, which may be seen from a distance of about 15 miles.

Reef extends from all sides except the north, which has a sandy beach, but only a short distance from the east side. There are patches of 3 to 4 fathoms off the south point, and the bottom is foul to the distance of about 2 miles.

A reef, with depths of from 2 to 3 fathoms, which breaks, lies about 2 miles south-westward of the west extreme of Pulo Simu.

TANAH MASA, or Batu island, the central and largest of the Batu group, forms, with its off-lying island, the south side of Pulo Nias Great channel. It is 25 miles in length, north and south, and 5 miles in breadth. This, like the other large islands, is moderately elevated and hilly, covered with trees, but its summits are not conspicuous with the exception of one 669 feet high, which is visible from the south-east and east for a considerable distance. There are a few Chinese and Niassers located here who cultivate cocoanuts.

Many small islands line its coasts both on the east and west sides, with moderate depths among them, and forming safe bays or harbours.

Tanah Masa with its adjacent islands extends north and south nearly 45 miles, fronted by a chain of about 20 isles of various sizes, some of them 13 or 14 miles distant from the main island, with dangerous reefs which are steep-to.

The east coast of Tanah Masa is low, practically uninhabited, and nearly everywhere overgrown with mangroves. Between Tanjong Seiro, its south extreme, and Karang Anjing on the coast reef, cocoanut trees have been planted at intervals and a few families have settled.

Near Tanjong Seiro is a considerable amount of high timber.

Reefs and islets extend a considerable distance eastward of the east coast, for which see the note on chart.

The coast between Tanjong Seiro (*Lat. $0^{\circ} 22' S.$, Long. $98^{\circ} 32' E.$*) and Karang Anjing forms a deep bay, on the north side of which the

General chart 2760.

Chart 2760, Aceh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

Kwala Karang Anjing discharges into the sea; but it dries at the mouth and low water.

- Good anchorage in 20 fathoms will be found with the east side of
 5 **Pulo Karang Anjing** bearing 35° true, and the mouth of the river 321° true. Vessels can anchor in 5 fathoms nearer the river by avoiding a small breaking reef off it. There are a few natives on the island, which is low, and has a conspicuous white beach.

- Pulo Tetedono** is hilly, and densely overgrown, and is connected to the shore by a reef which dries. Small vessels find an exceptionally sheltered anchorage in the south-west side which can only be entered when the reefs are visible at low water.

- Chipanana Besar and Kechil**, farther northward.—Chipanana Besar is round and covered with tall cocoanut trees; seen from a distance it resembles a bonnet; its western side is clear, but there is a
 15 drying reef extending from its eastern side. Chipanana Kechil is an overgrown sand cay bordered by an extensive reef.

- Penang, Lalibo, and Katadok**.—Penang, the largest, may be distinguished by its peculiarly shaped trees; they are all fringed by
 20 extensive reef except on the western sides; there are deep channels between them, but are only navigable with the sun in a favourable position; there is a sandbank which dries between it and Pulo Mahang.

- Fatilasa and Mahang**.—Pulo Fatilasa is a mangrove islet close to the shore; Mahang, separated by a narrow channel, has a
 25 village, with about 50 inhabitants; it is fringed by reef. There is anchorage for small craft off the village in mid-channel, but there is a $1\frac{1}{2}$ fathoms reef in its approach.

- Bumijuga, Masa, and Bai**.—Bumijuga, $1\frac{1}{2}$ miles westward of Masa, is an overgrown cay on the south side of a drying reef; there
 30 are a number of small reefs between it and Masa, and one of about 2 feet at half a mile south-east of it.

Masa is uninhabited; it is hilly with a few trees on its south side, and is fringed by reef. A number of reefs surround it, extending furthest to the northward, to a distance of $2\frac{1}{2}$ miles.

- Bai** (*Lat. $0^{\circ} 3'$ S., Long. $98^{\circ} 32'$ E.*) is the most populated island of the group, and is separated from Masa by a fairly clear channel. It is low, but has a conspicuous tree on its northern portion, visible a considerable distance from the north-westward and eastward.

- The Malay village has a mosque with a zinc roof. No supplies are
 40 obtainable.

Reefs extend for a great distance off its north-east and south-east sides.

General chart 2760.

Chart 2760, Aceh head to Chingkok bay. Var. $0\frac{1}{4}^{\circ}$ W.

Anchorage.—A good sheltered anchorage may be found westward of the mosque, but the coast should not be approached under a depth of 10 fathoms.

Adam and Lajohene.—Pulo Adam lies on the west side of a drying reef and is covered with tall cocoanut trees; there are a few houses on its south side. 5

Reefs, with depths of one to 4 fathoms, make it inadvisable to go between Adam and Lago. Lajohene is a small island near to Tanah Masa, with a channel of 6 fathoms between. 10

Lago lies about 3 miles north-east of Tanjong Batu Wawa (*Lat. $0^{\circ} 0'$, Long. $98^{\circ} 23' E.$*). It is low, with cocoanut trees, and a few inhabitants who support themselves by the cocoanut plantations.

Reefs extend for a great distance north-westward of the island; the eastern side is clear and can be approached from a south-east direction to a depth of 9 fathoms. 15

A sand cay with a single tree is situated on the reef at one mile westward of Lago.

Treba Kechil, and Treba Besar islets lie eastward of Pulo Bai, with numerous reefs between and around. They are mostly covered with shrubs. Treba Kechil has a few cocoanut trees. 20

Caution.—In addition to the countless reefs which lie between these islets and Tanah Masa, there are a number of reefs eastward of the Treba islets, as charted. The reefs farther south to the east of Tanjong Anjing are always marked by breakers. 25

Islands off north end. — Memong, Biang, and Tegaga (Tagaga) are the northernmost islets off the north coast; all are wooded. Biang and Baligi, south-west of Tegaga, are each marked by a conspicuous thick tree; both can be closely approached; their north-west sides are hilly; the fringing reef around Biang is only a cable wide with very deep water beyond it. 30

Tegaga, the westernmost has a reef with boulders on its western side, extending to a distance of 3 cables. The summit of Pulo Sibolo in line with the centre of Batu (eastward of Lorang) leads westward of it.

Memong, the easternmost islet, may be identified by a large rock above water near its north-west side, which is visible for many miles. 35

Reefs.—At one mile eastward of Memong is a patch of 5 fathoms, and at $4\frac{1}{2}$ miles eastward is a patch of $2\frac{1}{2}$ fathoms, from which the south side of Biang is in line with the north side of Memong. A patch of 3 fathoms lies between Memong and Biang. Between these islands and the shore are many reefs. Between the two north extremes of Tanah Masa there are eight small reefs between the bearings of 153° and 235° true, of Ujong Seropi, some with less than 6 feet water. 40

General chart 2760.

Chart 2760, Achek head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

Batu, Marit, and Lorang.—Marit lies south-east of Biang, and is hilly, and covered with cocoanut trees; its south-east side is clear.

- 5 Batu consists of some overgrown masses of pointed rocks southward of Marit, name not charted.

Lorang, the south-westernmost island, is low and overgrown with cocoanut trees; the channel between it and Marit with more than 5 fathoms water is one mile wide.

- 10 **Reefs.**—The reef around Lorang seems to extend some distance southward, a depth of 10 fathoms having been found at one mile off.

A large reef, with $3\frac{1}{2}$ fathoms water, which breaks heavily at times, and is apparently steep-to, lies 230° true, distant $3\frac{1}{2}$ miles from Lorang, in the western approach to Tello roadstead.

- 15 **North coast. — Anchorage.** — There is anchorage close off the north coast of Tanah Masa, and also in the bay close westward of Tanjong Batuwawa (*Lat. $0^{\circ} 0'$, Long. $98^{\circ} 24' E.$*), its bluff north-east extreme, but exposed to the north-westerly monsoon. A few supplies may be obtained here, but no water.

- 20 On the east coast, about 4 miles south-eastward of Tanjong Batuwawa there is anchorage in a depth of 10 fathoms, with good holding ground, close southward of a small islet lying near the shore. There is a watering creek just southward of it.

- The west coast** of Tanah Massa forms the eastern side of
25 Tanah Bala strait, one of the southern approaches to Tello roadstead. The chart is on too small a scale to render any description of it intelligible.

- PULO TELLO**, situated westward of the north end of Tanah Masa, is the chief and most populated island of the Batu group, and is
30 hilly; the blunt hill, 295 feet high, near the settlement, has some conspicuous trees on it. Further south is a hill covered with bush. The seat of government is here, where also the Dutch representative lives; this official is also the Harbour master. The population consists of
Malays and Niassers, with a few Chinese traders. There is also a
35 missionary on the island. Provisions are procurable in small quantities.

The east coast of the island can be approached closely southward of the settlement. The south point of the island is called Tanjong Si Rapa Rapa, with village of same name on it.

- 40 **Pulo Sibolo and Pulo Lulua** lie near the north-west extreme of Pulo Tello, south side of the entrance to the roadstead. Sibolo is conspicuous on account of the 246-feet high hill on its north-east end. Lulua is lower and fringed by a reef. The approach to the roadstead northward of Lulua has depth over 5 fathoms over a breadth

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

of 2 cables, but the bottom is very irregular. The $4\frac{1}{2}$ -fathoms patch, 7 cables westward of Sibolo, is separated from it by a deep navigable channel.

Plan of Tello roadstead on 2284.

TELLO ROADSTEAD (*Lat. $0^{\circ} 3' S.$, Long. $98^{\circ} 16' E.$*)

lies between the north-west extreme of Tanah Masa and Pulo Tello. It is nearly $1\frac{1}{2}$ miles wide in the entrance, and nearly a mile wide between the reefs extending from either side. Within it is about 2 miles in extent, with depths sufficient for all vessels. Failing a larger scale chart of the approaches, in which are several dangers, no particular directions are offered for it.

Dangers.—A detached reef, with a least charted depth of $2\frac{1}{2}$ fathoms, lies beyond the coast reef on the west side of the entrance, just within the 10-fathoms contour line and 6 cables from the shore. A patch of 2 fathoms lies $1\frac{1}{4}$ miles north-west of it and about one mile north of the east extreme of the northern island outside the entrance (Pulo Lulua).

On the eastern side the coast reef, which dries, extends about 3 cables off Ujong Seropi, both north-west and south-west of it.

Off the village a patch, dry at low water, lies 137° true, 3 cables from the flagstaff, and a patch of $3\frac{1}{2}$ fathoms, 42° true, 5 cables from the flagstaff; both are steep-to. On the eastern side, reef, on which is a lighthouse, extends about 4 cables northward of Batu Makele, and detached reefs about the same distance westward of Antinang, as charted.

Leading lights.—From a white iron framework on Batu Makele, is exhibited a light, at an elevation of 69 feet above high water.

On the reef fronting the above light and at a distance of 620 yards from it, a light is exhibited, from a white iron framework, at a height of 43 feet. These lights in line bearing 161° true lead in through the entrance.

Anchorage.—There is anchorage off the settlement, in depths of 12 to 15 fathoms, good holding ground, with the flagstaff bearing between 250° and 286° true; or in the same depths southward of the drying reef off the village.

Piers.—There are two small stone piers for boats.

Chart 2760, and plan on 2284.

Directions.—Vessels with local knowledge, coming from the southward can enter Tello roadstead from either side of the Spika (Sipika) group; from the south-eastward or from Padang by Tanah Bala strait; from the north-eastward or from Ayer Bangies, after pass-

General chart 2760.

Chart 2760, Acheh head to Chingkek bay. Var. $0\frac{1}{4}^{\circ}$ W.

ing northward of Pulo Pinie dangers, along the north coast of Tanah Masa; and from the northward, by passing eastward of Pulo Biang. From the westward there are passages between Sigata and Lorang, giving a berth to the breaking reef south-west of Lorang. Local assistance should be obtained for any of the entrances until large scale charts are available or the latest Dutch charts are on board.

From off the entrance, with the roadstead open, the leading light-structures in line bearing 161° true lead in the fairway.

- 10 **Tides and tidal streams.**—The rise of tide is similar to that at Ayer Bangies (page 366). On the whole, the stream in Tello roadstead sets northward on a rising tide, and more weakly to the southward on a falling tide. The flood stream runs northward through the channel between Pulo Sibrannun, Pono, and to the east of Batu, Makele, and further north joins the stream from the south-west, which runs between Tello and the island north-west of it; thence it trends eastward along the north coast of Tanah Masa. To the south of Pulo Simondong the flood runs towards Tanah Bala, but to the west of this strait the stream is very slight.

- 20 **PULO SIGATA** (*Lat. $0^{\circ} 8' S.$, Long. $98^{\circ} 11' E.$*) lies about 6 miles south-west of Pulo Tello. It is about $2\frac{1}{2}$ miles in length with a hill 315 feet high on its south-east side, forming a conspicuous mark from the southward. The island is flat elsewhere; sago palms are found in the interior, and belts of cocoanut trees line its coasts. It is fringed by reef which extends farthest on its south side, and on which the sea always breaks; the depths decrease rapidly within the 10-fathoms contour line.

- The population of Sigata consists mainly of Niassers, and numbers about 3,000, dispersed over seven villages, of which the principal is Bawah Setra, on the north-east side of the island. A branch of the Dutch Lutheran Missionary Society is established on this island.

- Anchorage.**—The least unfavourable anchorage is off Bawuh Setra, in depths of 9 to 10 fathoms, and the best landing place is also there. Farther south there are boulders along the shore; the west coast is nearly always unapproachable during the whole year, on account of the heavy breakers.

LIGHT.—From a white iron framework, 116 feet high, on the eastern hill of Pulo Sigata, a light is exhibited, at an elevation of 384 feet above high water. *See Light list.*

- 40 **The islands** to the eastward of Pulo Sigata, between it and Pulo Tello, namely, Bintuang and Hajau, are low, and covered with cocoanut trees. The channels between them are clear.

Pulo Sibrannun, south of Pulo Tello, is low, with cocoanut trees on it, and is fringed with rocks above water on the south and east

General chart 2760.

Chart 2760, and plan on 2284. Var. $0\frac{1}{4}^{\circ}$ W.

sides; off its south side is a noticeable overgrown rock named Nanta visible from some distance.

Eastward of Sibrannun and Pono, are Spika (Sipika) and Pertamuan, both hilly, and form in appearance one island; they are fringed by a wide reef which always breaks; there are boat channels between them, and patches of reef eastward of them. 5

Batu Makele lies northward of these islands, with a boat channel between, and on its north extreme are the leading lights for Tello roadstead, page 441. 10

Vessels with local knowledge can enter Tello roadstead on either side of Batu Makele. On the south coast of the island is Bahlughia village.

Tello Tello Gedang, and Tello Tello Kechil, are two islets northward of the north extreme of Tanah Bala, the first of which may be recognised by a pointed hill thickly covered with cocoanut trees on its south side; the second is entirely flat, but is also overgrown with cocoanut trees. The channel between them has irregular depths of $2\frac{1}{2}$ to 10 fathoms, and should not be used. 15

Pulo Makole (*Lat. $0^{\circ} 15' S.$, Long. $98^{\circ} 23' E.$*) has a cone-shaped hill on its north end, a conspicuous tree on its south end, and is visible from a distance of 15 miles. It is surrounded by reef on which two large boulders may be seen; it should not be approached within a depth of 10 fathoms. Two sunken reefs, with $3\frac{1}{4}$ fathoms and one fathom, lie outside the 10-fathoms contour, north-east and south-east of the island, respectively. 20 25

There are a few inhabitants on the eastern side.

Rocks.—At about 3 miles north-west of the hill on Makole are two rocks always visible on the north end of a reef with $2\frac{3}{4}$ fathoms water. Between it and Makole there is a reef with 5 fathoms water. 30

Pulo Samaleko is separated from Tanah Bala by a channel with a depth of 6 fathoms, but it should not be used without local knowledge as the reef fronts Tanjong Pasalahang to a distance of 6 cables; its north side is clear.

TANAH BALA is the southernmost large island of the Batu group. It is about 22 miles in length, north and south, and with an average breadth of 7 miles, tapering to its north extreme. At its northern end is a hill 886 feet in height, which appears pyramidal in shape from the east and north-westward. 35

The hill, 394 feet high, within Tanjong Hatik, its west extreme, is visible from a considerable distance from the northward, appearing as a separate island. The whole island is thickly wooded, and but for an occasional spot on the east coast is uninhabited. It forms, with Pulo 40

General chart 2760.

Chart 2760, and plan on 2284. Var. $0\frac{1}{4}^{\circ}$ W.

Bojo off its south end on which is a lighthouse (page 450), the northern shore of Siberut strait.

- Shoals.**—A small coral shoal, with a depth of $5\frac{1}{2}$ fathoms, lies with the north extreme of Pulo Makole bearing 61° true, distant $7\frac{1}{2}$ miles; it sometimes breaks.

A shoal, with 5 fathoms, lies about 3 miles northward of Tanjong Hatik. It is 4 cables in extent, with depths of 14 to 20 fathoms around; it is sometimes marked by breakers.

- Tanjong Pasalahang** is the north extreme of Tanah Bala; the islands in the offing have been described. The coast between it and Pulo Barogang, joined to the coast by a rocky ledge at 4 miles to the southward, forms a deep bay with a drying reef near the shore.

- Southward of the island the coast is clear with the exception of a $2\frac{3}{4}$ -fathoms patch just within the 10-fathoms contour line off Tanjong Chekeh, a low point with high trees. The whole coast is low but for the rocky Boh point, within which there is a conspicuous hill.

- Anchorage.**—The bay within Tanjong Foponua, $2\frac{1}{2}$ miles within Tanjong Hatik, affords sheltered anchorage from westerly and south-westerly swell, in $5\frac{1}{2}$ to 6 fathoms; it may be entered with a conspicuous hillock bearing 162° true.

Tanjong Foponua is covered with high trees, and the chart shows a reef off it.

- Tanjong Hatik, the west point of Tanah Bala, is rocky, thickly wooded, and has a hillock on it which renders it conspicuous, as does also from a distance the hill, 394 feet high, 3 miles eastward of it.

- Tanjong Itano Makinu** is the south extreme of the island; between it and Tanjong Hatik there is a bay with an overgrown rock, 7 feet high, connected to the shore by a drying ledge; this coast is not accessible on account of the breakers. There are two bays eastward of Itano Makinu; the eastern between Duru and Manaeh (Nanaeh) points is of no use as an anchorage; the one close eastward of Itano Makinu has an overgrown rock about 10 feet high in its centre, elsewhere it is clear. Vessels can lie sheltered here in the north-west corner in depths of 6 to 7 fathoms. Patches of 4 and 5 fathoms lie off Itano Makinu; the 10-fathoms contour is about one mile off-shore.

A patch of 8 fathoms lies half a mile eastward of Tanjong Manaeh, the south-east extreme of the island.

- Pulo Bojo**, off this coast, *see* Siberut strait, page 450.

East coast of Tanah Bala.—The eastern coast of Tanah Bala trends nearly due north for a distance of 22 miles to its north extreme. The northern part for a distance of 10 miles forms the west

General chart 2769.

Chart 2760, and plan on 2284. Var. $0\frac{1}{4}^{\circ}$ W.

side of Tanah Bala strait, westward of that island, and leads to Tello roadstead, in smooth water.

Coast.—From Tanjong Manaeh, the coast forms a slight bay between it and Pulo Orasa, 4 miles to the northward, in which lies Pulo Sigogolo (*Lat. $0^{\circ} 32'$ S., Long. $98^{\circ} 31'$ E.*), a small hilly islet, separated from the coast by a narrow channel with a depth of 8 fathoms, a reef extends 2 cables north-west of the islet. 5

Two streams flow into this bay, the Luaha and Sibuha, but their mouths dry. There are a few inhabitants south of the streams. 10

Pulo Orasa, 3 miles farther northward, and at about a mile off the coast, may be recognised by its fantastically-shaped trees; there are cocoanut trees on its north and west sides. The east side of the island is rocky, but free from danger; two reefs lie near its south side.

Nujagia and Hibau islets lie northward of Orasa, and are covered with cocoanut trees; here are reefs extending from Tanah Bala, obstructing the channel inshore of them. The easternmost reef, with $1\frac{1}{2}$ fathoms, lies $1\frac{3}{10}$ miles from Orasa; the east point of that island bearing westward of 187° true, leads eastward of it. 15

Simakonde, a small islet, lies in the small bay southward of the entrance of Tanah Bala strait, separated from the shore by a channel with depths over 10 fathoms. Small craft find good anchorage westward of the islet. A reef with one fathom water lies northward of the islet. A small stream detaches here, but it is barely navigable by praus for a short distance. 20 25

TANAH BALA STRAIT (*Lat. $0^{\circ} 22'$ S., Long. $98^{\circ} 30'$ E.*). —The south entrance of Tanah Bala strait has an average width of one mile. It divides Tanah Bala from Tanah Masa, and is a very convenient channel by day for vessels with local knowledge from Padang to Tello Tello, and vice versa. It is always calm. The coast on both sides is low, and the northern or Tanah Bala side is almost completely overgrown with mangroves. The Tanah Masa side is higher, with cocoanut trees in places. 30

At Nujalalei, on the eastern shore (not charted), there is a small stone pier. 35

The Dutch flag is hoisted when craft are passing it.

Pulo Bolo (Nujambolo) lies in the southern entrance; it is low and covered with cocoanut trees. The channel is clear to close inshore on the Tanah Masa side, but on the south-west side of it a reef extends 2 cables. 40

Directions.—This strait is available with local knowledge, as above stated, and presents no great difficulties.

Vessels should pass northward of Karang Laut and the other out-lying dangers mentioned, unless locally acquainted.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay.

PULO PENIE (Pini), situated between the Batu islands and the coast of Sumatra, has no distinguishing features. It is about 19 miles in length east and west, by about 5 miles in breadth, densely overgrown, sparsely populated, and has no navigable streams; its points are inconspicuous, and are quickly lost to view. The south-east extreme, Tanjong Pasingarang, is low and joined to the actual island by a narrow strip of land, so that at a distance it appears as an island.

Tanjong Labuan Bajan, westward of it, on the south coast, is easier made out from its tall trees.

Tanjong Besar is marked by a reddish-brown patch, whilst the west point, Tanjong Belobang, is conspicuous, as its name implies, owing to a number of holes in its rocky face.

Tanjong Antimonang, the central point of the north coast, is most noticeable from the northward; to the west of it are some tall trees visible from a long distance from the west and north-westward.

The island is surrounded by a coral reef excepting that portion on the north side between Tanjong Antimonang and Tanjong Batu Batu, where the coast can be closely approached.

Also at the south-west point and west of Tanjong Besar on the south coast the coast is clear. Landing is difficult in most places on account of the mangroves.

Numerous reefs surround the island; those named will now be described.

Dangers northward of Pulo Pinie. — Karang Laut (*Lat. $0^{\circ} 17' N.$, Long. $98^{\circ} 41' E.$*), with $2\frac{1}{2}$ fathoms least water, lies with Batu Belobang, the west point of Pulo Pinie, bearing 243° true, and the east extreme of the island 138° true; it is 6 miles from the island, and, not showing by discoloured water, is difficult to make out.

Liat Batu reef, of coral and rock, with $1\frac{1}{2}$ fathoms least water, $4\frac{1}{2}$ miles south-eastward of Karang Laut, and 4 miles from the island, with the east point bearing 147° true, distant 7 miles; a small reef, with a depth of 5 fathoms, lies a mile southward of Liat Batu.

A reef, about $2\frac{1}{2}$ cables in extent, with a depth of $4\frac{1}{2}$ fathoms, is situated $11\frac{1}{2}$ miles, 310° true, from Laut reef.

Ujong Rapa-Rapa, on which the depth is $4\frac{1}{2}$ fathoms, lies 3 miles from the island with Batu Belobang bearing 217° true, distant 6 miles; it only breaks slightly, and does not show discoloured water.

Rocks with 4 fathoms water lie 96° true, distant $3\frac{1}{2}$ miles, and 44° true, $2\frac{1}{2}$ miles, from Ujong Rapa-Rapa.

The outer danger (*Lat. $0^{\circ} 16' N.$, Long. $98^{\circ} 31' E.$*), to the north-westward of the island, is a reef about 5 cables in extent, with a depth of $4\frac{1}{2}$ fathoms, and surrounded by depths of from 23 to 27 fathoms; it lies with Batu Belobang bearing 178° true, distant 7 miles.

General chart 2760.

Chart 2760, Acheh head to Chingluk bay. Var. $0\frac{1}{4}^{\circ}$ W.

From Tanjong Batu Belobang to Tanjong Batu Batu, 8 miles to the eastward, a coast reef extends from 3 to 4 miles, and between this and the outer danger above mentioned there are three reefs with depths of 4 fathoms.

Dangers east and south-east of Pulo Pinie.—Pulo Ular (*Lat. $0^{\circ} 5' N.$, Long. $98^{\circ} 52' E.$*), a small, high islet, covered with cocoanut trees, lies about 3 miles eastward of the east point of Pulo Pinie, with reefs between.

Reefs extend $5\frac{1}{2}$ miles northward and about 4 miles eastward of Pulo Ular, as charted, and should be given a wide berth.

Karang Ular partially dries at low water springs, but is usually hard to make out; it lies 81° true, distant $3\frac{1}{2}$ miles, from Pulo Ular.

From it the south side of Pasingarang is in line with the north side of Pulo Ular.

Gusong Ular, a reef 7 cables in length, which dries, is situated about one mile southward of Karang Ular, and has one fathom water, with depths of 7 and 8 fathoms around.

Pulo Sembulaling (Sambulaling), low and narrow, is situated about 4 miles southward of Pulo Ular; Pulo Anso is situated $1\frac{1}{2}$ miles southward of it; both islets lie on a reef, about 3 miles in length in a north and south direction. The former is covered with cocoanut trees, whilst Anso is wooded, and has one conspicuous tree. They are visible from a distance of about 13 miles.

Karang Sembulaling, on which there is a rock that dries at low water, is surrounded by depths of 14 fathoms, and lies 65° true, distant $2\frac{1}{2}$ miles, from Pulo Sembulaling; it often breaks.

Karang Anso, the northern side of which dries, lies 180° true, distant $1\frac{1}{2}$ miles, from Pulo Anso; it always breaks. A reef lies north-north-east of Karang Anso, and $1\frac{1}{2}$ miles eastward of Pulo Anso there is a large reef.

Between Pulo Sembulaling and Pulo Ular there is a small reef with from 2 to 3 fathoms water; for others, *see* the chart.

A reef, with $2\frac{1}{2}$ fathoms, lies 4 miles, 202° true, from Pulo Anso. A reef with 3 fathoms lies 2 miles west of Pulo Anso; it is not marked by discolouration.

Islands and reefs on the south coast.—Karang Ujong Bakau (*Lat. $0^{\circ} 3' N.$, Long. $98^{\circ} 45' E.$*), which has a depth of 2 fathoms and breaks, lies on the broad coast reef near Felbo, eastward of Tanjong Besar; it lies $1\frac{1}{2}$ miles from the coast.

From 2 to $3\frac{1}{2}$ miles south-south-westward of Karang Ujong Bakau

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

lie two reefs named Karang Laut Satu and Karang Laut Dua, which break, and have depths of $1\frac{1}{2}$ and 2 fathoms, respectively.

Karang Tonga, which dries at low water, lies about a mile north-westward of Karang Laut Satu.

Pulo Masien (Masin), 6 miles westward of Tanjong Besar, is a low, flat island surrounded by a reef, which extends 7 cables south of it; between the island and Pulo Pinie there is a narrow passage.

Three islands, named Kasi, Pasakie (Pasakek) Besar, and Pasakie Kechil, lie to the southward of Pulo Masien; Kasi is an overgrown sandbank, with an extensive reef on its north side, and the other two islands are small, low, wooded, and each surrounded by a reef.

A coast reef extends southward of the south-west point of Pulo Pinie.

Montrado reef (*Lat. $0^{\circ} 3' S.$, Long. $98^{\circ} 44' E.$*) has several boulders which dry at low water, and is generally marked by breakers; it has depths of 30 to 32 fathoms around it. Pulo Treba Besar (page 439) lies 8 miles west of it. Westward of this reef there are various drying and other reefs obstructing the whole channel.

A large reef encumbers most of the area between Pasakie Kechil and Treba Besar.

SIBERUT STRAIT, between Pulo Bojo and Siberut island, is 21 miles wide, and the passage usually taken by steam vessels running between Acheh and Batavia viâ Padang. Sailing vessels have hitherto chosen the Seaflower channel, southward of Siberut island, said to be free from danger, but in which there is no anchorage ground. Since the survey of Siberut strait in 1877, and the establishment of a light on Pulo Bojo, as well as the safe anchorage afforded in the southern portion of the strait, most vessels will find it to their advantage to use it in preference to any other. *See views on page 450.*

Tides and tidal streams.—It is high water, full and change, in Siberut strait during the north-west monsoon at VIIh. 30m.; springs rise $2\frac{1}{2}$ feet.

Tides.—The vertical movement of the water in Siberut strait belongs mainly to the double-daily system and corresponds with that of Pulo Tello. The streams are irregular, and depend on the prevailing wind. The strongest streams are found close to the shores, where, to the north of Tanjong Sigep and between Pulo Bojo and Tanah Bala, they sometimes attain a rate of 2 to 3 knots in an east-north-east and opposite direction. During the westerly monsoon season the flood or easterly stream is sometimes overcome and even reversed by the westerly current which then runs. The ebb is increased by this current, and running in a west-south-west direction has a rate of about 3 knots.

General chart 2760.

Chart 2760, Aceh head to Chingluk bay. Var. $0\frac{1}{4}^{\circ}$ W.

For several successive days during the survey by the Netherlands Government surveying vessel, westerly and easterly streams were observed, the former usually being the stronger. After a few days without much wind, the stream turned at about high and low water. The flood stream, which runs in an east-north-east direction inshore between Pulo Bojo and Tanah Bala, spreads itself out like a fan eastward of the strait, a part of it trending northward along the coast of the latter and the remainder in an east-south-east direction. At the entrance to Tanah Bala strait the northerly portion meets the stream from that strait. In this locality, the ebb stream divides and runs north through Tanah Bala strait and to the south to Pulo Bojo in Siberut strait. There are north-east and south-west streams on the north-east and south-west ends of Van Bylandt reefs, whilst the stream across these reefs were found to attain a maximum rate of $1\frac{1}{2}$ knots in both directions.

On the east coast of Siberut, the flood runs to the southward and the ebb to the northward.

Winds.—From November to May, when the north-west monsoon prevails south of the equator, the weather is fine in Siberut strait, with light southerly and south-westerly winds. The wind is rarely stronger than a single-reef topsail breeze; in March and April strong westerly squalls lasting about 10 minutes may be experienced; in the other months of the monsoon, rain squalls with little wind may be expected. A hurricane has been known to occur during the above period. Over the Sumatra coast lightning was observed every evening, accompanied by clouds, which, when the land wind set in, passed out to sea towards Siberut, where they dispersed. At these times of the year there is always rain at night between Siberut and Padang. The wind during the day was mainly a light breeze from north-west in Siberut strait, and at night south-west and southerly. Thunder clouds massed over the islands during the afternoon, but they generally dispersed as they passed out to seaward.

If the wind shifted to south during the south-east monsoon period, which usually occurs between June and September, hard north-west and west winds prevail in Siberut strait, accompanied by heavy squalls.

Surf.—There is generally a long line of surf on the shores of the strait, particularly on its north and west portions. In the eastern portion, and under the Siberut shore, there is shelter from the sea which causes heavy surf on the northern shore, where all the dangers are stated to lie within the 3-fathoms contour line.

NORTHERN SHORE.—The south coast of Tanah Bala forms the north shore of Siberut strait, and has been described with

General chart 2760.

Chart 2760, Aceh head to Chingkuk bay. Var. $0\frac{1}{4}^{\circ}$ W.

that island in the preceding pages. Tanjong Hatik or West point, its western extreme, is rocky, and has a remarkable clump of trees resembling a hillock. *See view a abreast.*

- 5 **PULO BOJO**, lying about $1\frac{1}{2}$ miles southward of the south-east extreme of Tanah Bala, is $2\frac{1}{2}$ miles in length in a north and south direction, $1\frac{1}{2}$ miles in breadth, and 462 feet in height. It is hilly and densely overgrown; the lighthouse and a conspicuous tree are visible from a considerable distance from the east and west, but there are no
- 10 other conspicuous points. Bojo is nearly surrounded by a reef, which is 3 cables wide in places; the 10-fathoms contour is nowhere more than 6 cables off-shore, when it drops into deep water. The channel between it and Tanah Bala is free from danger. The island is uninhabited except for the lighthouse staff. There is boat anchorage
- 15 and a boat shed at the north-east point, with a road to the lighthouse.

- LIGHT** (*Lat. $0^{\circ} 39' S.$, Long. $98^{\circ} 32' E.$*).—On the south-west side of Pulo Bojo, from a white, iron, sixteen-sided tower, 215 feet in height, a light is exhibited, at an elevation of 361 feet above high water. A stone dwelling is situated near the lighthouse. *See Light*
- 20 *list.*

- DANGERS.—Northern shore.**—**Van Bylandt reefs** consist of two patches with depths of $2\frac{3}{4}$ and 10 fathoms, situated at the north and south extremes of a reef about 5 miles in length in a north and south direction, with a bottom of coral, sand, and stones;
- 25 the southern patch lies 82° true, distant 9 miles, from Pulo Bojo light. The western side is very steep, but on the eastern side the depths increase more regularly. Vessels will pass southward of them by keeping the lighthouse bearing 270° true, or northward of that bearing. The shallow spots often break.

- 30 **Southern shore.**—The northern end of Siberut island, 15 miles in length in an east and west direction, forms the south side of Siberut strait. It is low, but covered with tall trees. Tanjong Behuden or Siopa, the north-western extreme, is a rocky point, from which a sandy beach, fronted by a reef to a distance of 3 cables,
- 35 trends eastward to Tanjong Boompjes (Amongarun), a distance of 3 miles. Boompjes is a double point with a conspicuous white rock on the western head, visible from some distance northward; there is also a remarkable tree on it, which is only seen from the eastward. With the exception of Tanjong Boompjes the whole shore is sandy.
- 40 Tanjong Sigeb (Sigep), the eastern extreme, is low, and thickly wooded.

The hills within have no conspicuous summits; the highest reaches a height of 1,132 feet, and is cone shaped. *See views abreast.*

- 45 **A bank**, with general depths of under 20 fathoms, extends for a distance of 14 miles from the north end of Siberut, or more than half-

General chart 2760.

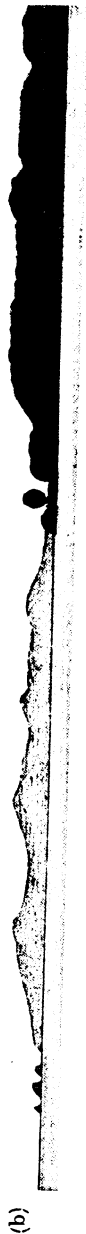
Siberut strait and island.



(a) West point.

T a n a h B a l a .

Siberut strait, north shore. South extreme of Tanah Bala bearing 22° true, distant 7 miles. South extreme. *Pulo Bojo. Lt. Ho.*



(b)

Boompjeshoek.

Siberut strait, south shore. Tanjong Bumpyes (Boompjeshoek) bearing East 90° true.



(c)

*Pulo Pulo
Bouqueche. Sigr.*

Kembaar.

*Tanjong
Siget.*

*Tanjong
Boompjes.*

Siberut strait, south shore. Tanjong Sigeb bearing 225° true, distant 3 miles.



(d)

Anna.

Carolina.

Henriette.

Kalumpong.

Siberut island, north-east coast. Off Sungi Silipat.

Chart 2760, Acheh head to Chingkok bay. Var. nil.

way across the strait, and has a breadth of about 12 miles. The 100 fathoms is joined to that of the Batu islands.

Macassar (Makasser) reef (*Lat. $0^{\circ} 49' S.$, Long. $98^{\circ} 38' E.$*), with less depths than 2 fathoms ($1\frac{1}{2}$ to one fathom supposed), lies near the west extreme of this bank; it is easily recognised in the daytime by the high breakers on its shallow portion. The reef extends one mile beyond the breakers, and the 100-fathoms contour lies $1\frac{1}{2}$ miles beyond except to the east and south-east of the reef, where it is joined to the ridge extending from Tanjong Sigeb in the direction of the Van Bylandt reefs by a coral flat with depths of 13 to 30 fathoms. On this ridge, with Pulo Bojo light bearing northward of 270° true, the depths are from 20 to 26 fathoms, sand, with occasional coral; its breadth is 6 miles, and its sides slope sharply down into 100 fathoms.

To the south of lat. $0^{\circ} 43' S.$ the ridge slopes more gradually, with depths of 17 fathoms and less. Beyond the eastern side the depths exceed 100 fathoms, whilst to the westward the ridge merges into the bank above described.

Reefs.—There are 5 patches of reef, with depths of $3\frac{1}{4}$ to 5 fathoms on the ridge, all marked by discolouration. The patch situated $6\frac{1}{4}$ miles, 322° true, from Tanjong Sigeb is only visible when a westerly swell is on. In addition to these patches there are several others with less than 10 fathoms in the neighbourhood of the two northernmost dangers. Under ordinary circumstances these ridges are marked by tide-rips. Eastward of Tanjong Sigeb the depths run sharply down into 100 fathoms or more.

Near the south shore of the strait there are a few coral reefs. One, with a depth of $3\frac{1}{2}$ fathoms, lies 3 cables north-west of Tanjong Sigeb, the south end of the ridge before described; the depths are greater between it and the point. On the north shore, farther westward, inside the 10-fathoms contour, there are a couple of $3\frac{3}{4}$ to 5 fathoms, sand and stone, ridges. With these exceptions the north shore is clear, with a sandy bottom.

Anchorage.—The best anchorage on the north coast of Siberut is between Tanjong Boompjes and the point next westward of Tanjong Sigeb, where the depth is about 10 fathoms about 2 miles from the shore, deepening quickly to 12 and 14 fathoms further out; or a berth may be taken up half a mile off the shore, in 5 or 6 fathoms, sandy bottom, avoiding charted dangers. There is also anchorage, over sand, in depths of from 10 to 15 fathoms, with the north-east extreme of Tanjong Sigeb bearing about 120° true.

The coast between Tanjong Sigeb and the next point westward of it is steep.

General chart 2760.

Chart 2760, Acheh head to Chingkuk bay. Var. nil.

Directions.—Vessels approaching Siberut strait from the westward should steer to pass about 2 miles southward of the west point of Tanah Bala, and will sight Pulo Bojo, with its lighthouse, the light from which is visible about 27 miles. The best course is to pass between Pulo Bojo and Macassar reef, which is clear of all danger, and the reef is nearly always to be seen by the breakers. The island should be passed at the distance of 2 or 3 miles, steering about 90° true, until Tanjong Sigeb bears 155° true, when course may be shaped for the desired port.

Course may also be shaped by day along the north coast of Siberut island, passing Tanjong Boompjes at a distance of 2 miles, and Tanjong Sigeb, the east point, at about one mile; by this means the patches are avoided. In this track, anchorage may be taken anywhere in moderate depths, over sand, whilst northward of Macassar reef there is no anchorage; so that for sailing vessels, possibly meeting with light winds and an adverse tide, the southern track through the strait is recommended.

Vessels from Padang or elsewhere passing westward through the strait in thick weather, may be affected by a cross-current whose directions cannot be given, but they usually follow that of the wind, with the consequence that a vessel may be swept on to the shoals on the ridge; the Thomson or some other sounding machine should be kept in constant use until the position of the vessel is assured.

By night.—From the westward steer for Pulo Bojo light bearing 90° true, pass southward of it at a distance of about 2 miles, thence bring it to bear 276° true, and steer 96° true, using it as a stern mark, which will lead 3 miles northward of the reefs on the east side of the bank.

From the eastward steer for the light bearing 276° true.

MENTAWI ISLANDS.—General remarks.—The Mentawi islands consist of four large inhabited islands, namely, Siberut, Sipora, North and South Pagi, and of several smaller, which are not inhabited. They are of volcanic formation, and earthquakes occur from time to time. They are hilly. The geography of the eastern sides of these islands is slightly known; the western sides are not known at all; a heavy breaking sea prevails on the latter sides, and landing is almost impossible at all times.

The temperature and climatic phenomena vary considerably on the east and west coasts. When the wind is blowing hard from the west or north-west on the west coasts, there are sometimes fresh easterly winds on the east coasts.

There are no definite wet and dry seasons.

General chart 2760.

Chart 2760, Acheh head to Chingkok bay. Var. nil.

Westerly and north-west winds usually bring rain, but the rainfall is also heavy in the south-east monsoon period. At these times the weather is very variable, and days of rain are succeeded by bright and clear weather.

The eastern coasts are particularly unhealthy.

SIBERUT ISLAND is about 57 miles in length, and from 15 to 24 miles in breadth. The north coast of the island has been described on page 450.

It is a fairly high island, wooded, without any conspicuous points, and with low stretches of foreshore which the constant accumulation of stone deposits have formed. These flat stretches along the coast are covered by the rising tide, and further inland become extended marshes which dry sufficiently to be walked over after persistent droughts, but which are submerged in the rainy season. Sandy beaches are numerous on the north, north-east, and south sides, and there is usually a heavy breaking surf on the western side.

Several small islands lie close to the coast on the eastern side, others interspersed with shoals lie off the south-west and south sides.

The inhabitants of Siberut are peaceful, but timid, and friendly intercourse was established by the Netherlands surveying vessel with the inhabitants of Tabekat bay on the east coast, and with Katorei bay on the south coast; the people are in a most backward state of civilization, and go about almost naked. They are armed with bows and arrows, some of which are poisoned (1912). Their boats are made from tree trunks. Fishing, hunting, and hut building are the chief occupations of the men, the women doing the remainder of the work. Fruit and poultry were obtainable by barter.

There are a number of islets and reefs at from one to $1\frac{1}{2}$ miles off-shore between Tanjong Sigeb and Tabekat bay.

East coast.—Pulo Siger (Masien) (*Lat. $0^{\circ} 57'$ S., Long. $98^{\circ} 57'$ E.*), situated 4 miles south-eastward of Tanjong Sigeb, is a small, wooded island, surrounded by a sandy beach, and encircled by a coral reef which, south-east of the island, dries at low water.

A bay named Labuan Bajau lies between.

Dangers.—Two coral reefs, with depths of 4 and 3 fathoms, lie 110° true and 133° true, distant 8 cables and $1\frac{1}{10}$ miles, respectively, from Pulo Siger, and southward of this there are several reefs lying more than a mile from the coast. The Dutch Sailing Directions are not readable with our small scale chart.

Anchorage.—There is anchorage southward of Pulo Siger, which may be approached by keeping close to the reef extending about half a mile south-east of that islet, to avoid shoal patches of 3 and 4 fathoms lying less than one mile south-east of it, and anchoring, with

General chart 2760.

Chart 2760, Acheh head to Chingkek bay. Var. nil.

the islet bearing 20° true, distant about one mile, in 6 fathoms water, over sand.

Plan of Tabekat bay on 1701.

- 5 **TABEKAT BAY** (*Lat. $1^{\circ} 4' S.$, Long. $98^{\circ} 58' E.$*) is situated on the east coast of Siberut, about 9 miles southward of Tanjong Sigeb. It is about a mile in extent, with depths of 8 to 12 fathoms, and affords sheltered anchorage from all winds, being protected from seaward by Pulo Langeirak (Langeira) or Carolina and from the northward by
10 the spit extending off Sungi Tabekat. It has two entrances, the northern passing westward of Pulo Langeirak and between it and the spit off the mouth of the river, and the southern between Pulo Langeirak and Pulo Limo, each with a depth of about 10 fathoms.

- The coast northward of the bay is steep-to, thickly wooded with high
15 trees, and off it lie two islands, the outer named Pulo Katumbang or Kris and the inner Pulo Umana or Bertha; a reef, steep-to, which dries, lies 3 cables southward of the latter island, and the reef fringing that island extends 3 cables northward of it. These reefs lie between the islands, two of which dry.

- 20 A reef, with 7 feet water, extends $2\frac{1}{2}$ cables in a 350° true direction from the north point of Pulo Langeirak, and having a depth of 16 to 19 fathoms close-to; a reef, on which the depths are from one fathom to 4 fathoms, extends, in a south-south-east direction, for nearly 4 cables from the island, and is also steep-to.

- 25 Pulo Limo is overgrown with mangroves, and is now connected with the shore by a ridge on which mangrove trees are growing.

Karang Pela, situated on a reef a quarter of a mile in length, lies $1\frac{1}{4}$ miles north-eastward of Pulo Umana, with a small reef at 2 cables south-west of it.

- 30 A reef, $2\frac{1}{2}$ cables in extent, with a sand cay on its western side, lies 60° true, distant one mile, from Pulo Umana; it is steep-to, with 23 fathoms inshore of it.

A reef lies 2 cables south of the east point of entrance to the shallow inlet northward of Tabekat bay.

- 35 Tabekat, 935 feet high, is the highest hill on this part of the coast; seen from the eastward and south-eastward it has a rather sharp summit.

- Sungi Tabekat** has a drying mudbank about 3 cables in extent fronting its mouth; it can only be entered by boats at high water. In
40 the river there are depths of from 2 to 3 fathoms, and boats can ascend about 2 hours' journey to a village whose inhabitants are friendly, and where the stream is about 10 yards wide. The banks of the river are thickly overgrown with mangroves and nipa palms.

- Anchorage** may be obtained in Tabekat bay in a depth of about
45 10 fathoms, perfectly sheltered.

General chart 2760.

Plan of Tabekat bay on 1701. Var. nil.

Directions.—North entrance.—From the offing, steer for Tabekat hill in line with the south extreme of Pulo Umana, bearing 283° true, until Karang Pela comes in line with the sand cay bearing 339° true, when a course of 260° true should be steered between the drying reef south of Umana and the drying spot on the north end of Pulo Langeirak reef. This passage is about 4 cables wide, and the reefs on either side are steep-to. When the whole of Pulo Limo is open westward of Langeirak, a vessel may anchor, or proceed into Tabekat bay, keeping along the coast of Langeirak to avoid the spit off the mouth of the river, and take a berth as desirable. 5 15

South entrance.—Steer for the north extreme of Pulo Limo bearing 282° true until the east side of Pulo Umana is in line with the east side of Pulo Langeirak, when steer 304° true for Pulo Umajorong, anchoring as requisite. The northern entrance is the wider, and therefore preferable for a steam vessel. 15

Chart 2760, Acheh head to Chingkuk bay.

COAST.—Sungi Silipat flows into the sea at a point 5 miles southward of Tabekat bay, the coast between being covered with high trees, and with a small sandy beach which is steep, the 5-fathoms contour line being not more than 3 cables from it. There is a depth of about 3 feet at low water over the bar, with 6 fathoms within it, decreasing to 2 fathoms above. See view *d* on page 450. 20

Anchorage may be obtained, in a depth of 15 fathoms, at one mile north-north-eastward of the entrance. 25

Plan of Silugui bay on 2284.

SILUGUI BAY (Lat. $1^{\circ} 14' S.$, Long. $99^{\circ} 2' E.$) lies about 10 miles southward of Tabekat bay. It is about one mile in length, east and west, and the entrance is 8 cables in width; it has general depths of 18 to 28 fathoms. 30

A reef, with a depth of $1\frac{3}{4}$ fathoms, steep-to, is situated in the entrance, with the south-east point of Pulo Togga Tesebukan bearing 227° true, and the north point of the bay 4° true. A reef with $1\frac{1}{2}$ feet water lies on the northern shore, and of 3 feet on the southern shore, as charted. Sungi Silugi lies between Silugui and Tabekat bays. 35

Anchorage.—There is anchorage off the mouth of the river, in a depth of about 20 fathoms; the shallow shore reef extends off the river for a distance of about 3 cables, and is steep-to, dropping into deep water.

Chart 2760, Acheh head to Chingkuk bay.

Coast.—The charts show an islet and rocks near the coast at about 11 miles southward of Saibi bay. 40

General charts 2760, 2761.

Charts 2760, 2761.

Saibi bay (*Lat. 1° 21' S.*) is marked by a high spur of the coast range. Sungi Saibi, which enters it, is navigable for native craft. The coast is very steep, and there are good facilities for anchoring. Vessels of 12 feet draught can anchor on the coast reef north-east of the mouth of the river, in 4 to 5 fathoms. Larger vessels should anchor south of the river, behind Siata Nusa island. Reefs which dry lie from one to 2 miles off-shore both north and south of the river.

Plan of Simalapeh and Siberut bays on 866.

SIMALAPEH BAY (*Lat. 1° 33' S., Long. 99° 12' E.*) is about 2 miles in extent. According to the plan it affords anchorage in about 13 fathoms, open to easterly winds, at 3 cables eastward of the south extreme of Pulo Timonganai, which island is $8\frac{1}{2}$ cables in length, parallel to the shore, and fringed by reef.

There is anchorage close off its south extreme in 5 to 8 fathoms, open to easterly winds, and in the bay between the island and the shore in depths of 7 to 10 fathoms perfectly sheltered from all winds. The best entrance is northward of the island. There is also anchorage in about 8 fathoms between the south end of the island and Tanjong Simalapeh, south-west of it.

Dangers.—Two islands lie on the shore reef off Tanjong Simalapeh, and there is a sunken reef 2 cables in extent close outside the shore reef eastward of the islands. A sunken rock lies close to the reef, fronting the western shore, abreast the south end of Pulo Timonganai. The reef fringing the shore between the islands off Tanjong Simalapeh and Siberut bay extends about $1\frac{1}{2}$ cables off and breaks in places.

Siberut bay, about one mile wide, is exposed to winds from north-east to south-east, and the depths a short distance off the coast reef are over 20 fathoms. The reef extends about $1\frac{1}{2}$ cables off both north and south of the river entrance, and there is a patch of 2 fathoms, steep-to, close off its edge south-eastward of the mouth.

Precarious anchorage in 25 fathoms may be obtained eastward of the 2 fathoms patch, with a tree with a white trunk, situated on the beach at 4 cables northward of Siberut bearing 263° true, and the mouth of the river 270° true. The anchorage must be cautiously approached, as the water shoals suddenly to the shore reef. The sea in the bay is at times so high that the rollers sometimes break in 20 fathoms.

A depth of 4 feet was found on the bar of the river in 1911. The plan shows a house and a flagstaff on the south point of the entrance. The small bay of Simopinang, southward of Siberut bay, is visited by a large number of fishermen during the fishing seasons.

Chart 2760, Aceh head to Chingluk bay.

Chimpungan bay, in which a stream of the same name discharges, lies southward of Silugui bay; it is of no use as an anchorage

General charts 2760, 2761.

Chart 2760, Acheh head to Chingkok bay. Var. nil.

owing to the many coral reefs which lie in front of it, and which are always marked by breakers.

Sebikoket islands (Lat. $1^{\circ} 44' S.$, Long. $99^{\circ} 18' E.$) lie one mile northward of Tanjong Katorei, and south-east of them there is a reef about 3 cables in diameter with a rock awash which breaks; it lies with the northern point of the island bearing 302° true, distant one mile, and Tanjong Katorei 229° true, with depths of 3 to 7 fathoms between it and the coast.

The coast reef abreast the islands is only about 30 yards wide.

Pulo Manilot, with a sunken rock southward of it, is charted about midway between Siberut bay and Sebikoket islands.

Plan of Katorei bay on 2284.

KATOREI BAY (Lat. $1^{\circ} 47' S.$, Long. $99^{\circ} 18' E.$), situated at the south-east extreme of Siberut island, has an entrance about a mile in width, and stretches in about 5 miles in a north-north-west direction, narrowing inside the entrance to about 3 cables with a depth of 5 fathoms. Sungi Katorei discharges into it. The shores of the bay consist of densely overgrown hilly land; along the western side of the entrance there is thick vegetation close down to the water's edge; there is an occasional village.

Pulo Selenna, 4 cables in length, 2 cables in breadth, covered with high trees and surrounded by a small coast reef, is about a mile south-eastward of the entrance.

Tanjong Katorei, on the east side of the entrance, has a narrow sandy beach. It is covered with high trees, as is also Pulo Lebu on the western side.

Dangers.—The shore reef extends in a point to a distance of 4 cables between Tanjong Katorei and the entrance to the bay. Extending half a mile south-east of Pulo Selenna there are two reefs, with depths of 3 and 6 feet, and three shallow reefs encumber the channel between the island and Tanjong Katorei.

Two rocks, which dry, lie about 3 cables southward of Pulo Lebu, west side of the entrance to the bay; reef extends $2\frac{1}{2}$ cables northward of Lebu.

Anchorage may be obtained, almost sheltered from all winds, about a quarter of a mile westward of Pulo Selenna, in depths of from 6 to 7 fathoms, over good holding ground. There is better shelter farther in, abreast Pulo Toboh, in about 5 fathoms, mud bottom.

Charts 2760, 2761.

The following information on the islands and dangers off the south end of Siberut is written from the chart.

General charts 2760, 2761.

Charts 2760, 2761. Var. nil.

Pulo Pangalang, a triangular island about 4 miles in length, lies close southward of Pulo Lebu in Kaṭorei bay, and protects the anchorage in that bay from south and westerly winds.

- 5 Karamatyit, Montrado, and West island lie southward of Pangalang; the two former are surrounded by reefs. West island (*Lat. 1° 56' S., Long. 99° 18' E.*) is the southernmost island, and the chart shows no soundings.

- Jenny strait is the passage between Pangalang and Siberut island, and apparently has not been examined.

At 6 miles westward of Pulo Pangalang is Pulo Koraniki, a small islet about 2 miles off Tanjong Siberut. At 5 miles west-south-westward of it is Pulo Lipa, connected with Koraniki by a sunken ledge. Pulo Bete lies 4 miles northward of Lipa.

- 15 Teleleo bay, between Pangalang and Koraniki, apparently affords anchorage, but is fully exposed to southerly winds.

The west side of Siberut is still unexplored. Like Pulo Nias and the Batu islands it is much exposed during the westerly monsoon period.

- 20 **SEAFLOWER CHANNEL**, formed between the islands off the south side of Siberut and Sipora, is named after H.M. brig *Seaflower*, Captain W. Owen, who passed through the channel in 1806, and who describes it to be clear of danger; no soundings were obtained at 30 fathoms in passing through. *See view a of north shore on page 460.*

- 25 As there is no anchorage ground in this channel, Siberut strait, which affords anchorage and has been surveyed, is much to be preferred.

- SIPORA (Sikabu)**, one of the Mentawi islands, forms the south side of Seaflower channel, and between Tanjong Tilleru, the north-east point, and Cape Marlborough, the south point, is about 27 miles in length, and from 4 to 10 miles in breadth. The island is wooded and a little less elevated than Siberut. It has a narrow sandy beach on its northern side; the southern side rises sheer from the sea.

- North coast.**—Siburu islands, lying off the north coast, are hilly, and may be seen from a distance of 20 miles; a hill on the north-east side of Sipora is visible 30 miles.

- A reef** extends 4 cables off the north-east extreme of Sipora, and westward towards Hurlock bay. Setan island, northward of it, has a reef extending south-eastward, and there is a reef southward of Setan; others may exist.

Plan of Hurlock bay on 866.

HURLOCK BAY (*Lat. 2° 3' S., Long. 99° 35' E.*), consisting of an outer and an inner bay, lies on the north side of Sipora, and directly south of the small islands which front the shore.

General charts 2760, 2761.

Plan of Hurlock bay on 866. Var. nil.

The outer bay has moderate depth for anchorage, with a soft bottom, but is open to northerly winds. The inner bay is about one mile in diameter, with an entrance about half a mile in width, with depths of 4 to 7 fathoms over a breadth of 2 cables. In entering the inner bay, the northern side of the channel should be kept, as a reef extends some distance from the south side of the entrance. 5

Anchorage.—There is anchorage, sheltered from all winds, in the northern part of the inner bay, in depth of 8 to 10 fathoms, with 3 to 5 fathoms nearer the shore, which is a red sandy beach. 10

There is no drinking water obtainable; the bay is visited by fishermen in the seasons, and large quantities of fish are caught.

Chart 2761, Chingkuk bay to Strait of Sunda.

EAST COAST.—Aspect.—The east coast of Sipora, near the shore is low, but inland there are everywhere hills, which, however, do not offer conspicuous peaks. The Si Mangkukju or Turkish Cap, towards the southern part of the island, is the one exception; its round summit rises above the surrounding hills, and is sometimes visible up to a distance of 35 miles. 15

There is a conspicuous point at about $1\frac{1}{2}$ miles north of Semebaai bay, distinguishable from the other points of the coast (all of which are low and overgrown) by two hills, the easternmost at 4 cables within the point, and the westernmost, Sikichi, at about half a mile within the other. There is a line of hills a little within the north-east coast. 20

The rivers or streams are of little importance; Sungi Sigor-soinan discharges on the north-east coast in a bight eastward of Hurlock bay. The other streams are the Sereinu at 2 miles northward of Siuban bay, the Siuban flowing into that bay, the Sibaran, 3 miles farther southward, and the Sikichi at 2 miles northward of Semebaai bay. There are small villages at their mouths. 30

North-east of the Sibaran stream the depths rapidly increase to 60 fathoms, and outside a depth of 7 fathoms the bottom is blue mud. A narrow reef fringes the shore, its greatest width being about near the Sibaran mouth.

Reefs.—The coast is considered free from danger from its north-east extreme to Semebaai bay, with the exception of the 5-fathoms patch off the mouth of the Sungi Sikichi. 35

The Jawa sandbank, about 3 cables from the shore, south-east of Semebaai and off Simongkuchu, is just visible at high water. There are a couple of reefs north-north-west of it; the southernmost dries. Vessels should keep a mile off-shore when abreast them. 40

Cape Marlborough is high and steep, but the coast reef extends $1\frac{1}{2}$ miles off it.

General charts 2760, 2761.

Chart 2761, Chingkok bay to Strait of Sunda. Var. nil.

Supplies.—A vessel may be supplied with wood, water, a few hogs, yams, poultry, and cocoanuts, by the people of the few straggling villages on the east side of the island.

- 5 **Weather.**—The weather during July and August, when this coast was visited, was variable, the wind usually south or south-east, varied by northerly winds and heavy north-west squalls, which latter lasted only a few hours. During August the rainfall was heavy.

Plan of Siuban bay on 866.

- 10 **SIUBAN BAY** (*Lat. 2° 7' S., Long. 99° 40' E.*) is about one mile in length and half a mile in width between the wooded entrance points, not easily distinguished from the land behind them; it has depths of 20 to 30 fathoms in a channel about 3 cables wide, between the reefs extending from those points. A small group of trees on the
15 north-west point, of a little darker colour than the others, is sometimes made out. A white and conspicuous sandy beach known as Pasakiet bay lies one mile northward of the entrance. *See view b, abreast.*

- The head of the bay is shallow, to the distance of $1\frac{3}{4}$ cables off, north-
20 ward of the river, and to about half a cable southward of it, dropping very quickly into deep water.

Anchorage.—A fairly good anchorage is in a depth of 23 fathoms, with the south-east point of the bay bearing 107° true, and the river mouth 244° true.

- 25 The precaution of sounding around the vessel should be taken, for in some parts there are patches of coral rock. Sungi Siuban is on the western side of the bay. The boats of the *Asahan*, in 1903, went up to the village, distant 3 miles from its mouth; they found a depth of 3 feet on a rising tide on the bar, and from one to 9 feet at low water
30 within; the width of the stream varied from 6 yards to 23 yards.

- Tides.**—It is high water, full and change, at about Vh.; springs may rise 4 feet, but the rise was inconsiderable when the Netherlands vessel of war *Edi* visited it in 1900. The flood stream sets southward and the ebb northward along the coast: the greatest
35 rate recorded is half a knot.

Plan of Semebaai bay on 866.

- SEMEBAAI BAY** (*Lat. 2° 14' S., Long. 99° 45' E.*), $8\frac{1}{2}$ miles south-east of Siuban bay, may be known by the Turks Cap hill to the southward, and by Seme, a small coral islet covered with shrubs and
40 casuarina trees, and surrounded by a coast reef, lying in the middle of the entrance. The bay is about one mile wide with depths of 13 to 16 fathoms over the greater portion of it, and the coast reef only extends a short distance off the entrance points. *See view c, abreast.*

General chart 2761.

Off-lying islands. Sipora—Trieste—Engano.

(a)

Karamayit.

Montrado.

West island.

Seaflower channel. North shore; southward of Lipa island.

(b)

Turks cap.

Siuban bay.

Sipora, east coast. Siuban bay bearing 260° true, distant 3 miles.

312° true.

(c)

290° true.

Sipora, south-west coast. Turks Cap bearing 308° true, distant 13 miles.

Turks cap.

318° true.

(d)

Trieste island S. E. by S., distant 15 miles.

(e)

Plan of Semebai bay on 866. Var. nil.

Anchorage.—Southward of the islet the bottom is mud, and suitable for anchorage in depths of from 10 to 20 fathoms. A good position, in 15 fathoms, is with the east point of the bay bearing 87° true, and the east side of the islet in line with the northern point bearing 345° true. The bay is uninhabited. 5

Chart 2761, Chingkok bay to Strait of Sunda.

Cape Marlborough, the south point of Sipora, is steep, and has a reef extending $1\frac{1}{2}$ miles from it, as before remarked.

The West coast of Sipora is rocky, with some small islands adjoining, and the sea breaks high upon the shore. Sidua Mata and Noko, two of these islands, about 8 and 20 miles, respectively, north-westward of Cape Marlborough, lie close to the shore, and are low, flat, covered with cocoanut trees, and rocky to seaward. Tobo island lies farther northward. 10 15 .

Burung bay (Lat. $2^{\circ} 9' S.$, Long. $99^{\circ} 32' E.$) lies on the north-west side of Sipora, with the islands of the same name in its entrance.

A rocky patch of $2\frac{1}{4}$ fathoms lies in the southern entrance, and the chart shows a sunken rock in the northern entrance. The bay is exposed to north-west and northerly winds, and the islands afford no protection. 20

SIPORA STRAIT, between the south end of Sipora and North Pagi island, is about 13 miles in breadth, and considered to be safe. The islands are said to be connected by a coral ridge of from 20 to 40 fathoms; on this ridge, which lies with Turks Cap in line with Cape Marlborough, and at about 3 or 4 miles from Sipora, there is a bank with a least known depth of about 7 fathoms, found by the British vessel *Dhuleep Singh* in 1884; it should be avoided, as less water may exist. 25

This vessel, when passing through, found depths of 22 fathoms, rapidly decreasing to 13 and $7\frac{1}{2}$ fathoms, with the bottom plainly visible (Lat. $2^{\circ} 26' S.$, Long. $99^{\circ} 50' E.$). 30

PAGI ISLANDS.—**General remarks.**—These islands are together about 55 miles in length, separated by Sikakap strait. Both the islands are high, covered with large trees, and may be seen in clear weather about 40 miles. The inhabitants are simple and inoffensive. Cocoanut and sago palm are cultivated. 35

NORTH PAGI is about 18 miles in length by 15 miles in breadth; it has no conspicuous points. There are some good anchorages on its eastern side, although they are not entirely sheltered. 40

Simanganju road (Lat. $2^{\circ} 34' S.$, Long. $100^{\circ} 6' E.$) is an open anchorage, situated about 7 miles south-east of the north extreme of

General chart 2761.

Chart 2761, Chingkuk bay to Strait of Sunda. Var. nil.

North Pagi, which point is covered with tall trees. In the northern part of the road lies the village abreast an islet, with depths of from 5 to 6 fathoms, over mud, at about a quarter of a mile off the islet.

- 5 There are some low islets northward of the road. These islets are beginning to be submerged, and some cocoanut trees are standing in the water. Within the road the land becomes hilly.

Anchorage.—Good anchorage may be obtained, in depths of from 14 to 16 fathoms, over sand and shells, about 7 cables from the coast, with the northern mouth of the river bearing 191° true, and Tanjong Simontobi (covered with tall trees, steep, and conspicuous from some distance), 132° true, or closer in.

Plan of Simanganja road on 2761.

Simanganja (Saumangaja) road (in about *Lat. $2^{\circ} 37' S.$, Long. $100^{\circ} 8' E.$*) is small, and has a reef, with rocks above water, extending north-westward of its south point; off this point is a small islet fringed by a reef. Pulo Simanganja, small and covered with brushwood and cocoanut trees, is on the north-eastern side of the road, and the village is about a quarter of a mile westward of the island.

- 20 Inland there are three small hills.

Anchorage may be obtained in the road in depths of from 5 to 6 fathoms, over mud, about 3 cables eastward of Pulo Simanganja.

About 3 miles southward of Simanganja bay is Simomtobi head, with a shoal near the shore at $3\frac{1}{2}$ miles southward of it (*chart 2761*).

- 25 *Plan of Silabulabu bay on 2761.*

WEST COAST.—**Silabulabu bay** (*Lat. $2^{\circ} 44' S.$, Long. $98^{\circ} 56' E.$*), on the west coast of North Pagi, affords safe anchorage, being protected by the Montrado or Silabu Mabue island, which stretches nearly across between the points of the bay. Eastward of this island is Mangkasar or Silabu Magosok island, with a narrow channel between them, with a depth of 4 to 10 fathoms.

- The best channel to the anchorage is northward and eastward of Montrado, avoiding the reef with $1\frac{1}{2}$ fathoms on its eastern side at 2 cables northward of its west point. The channel southward of Montrado, between it and Tanjong Silabu, being narrow, only 135 yards wide between the shore reefs, with irregular depths of 5 to 8 fathoms, is not recommended. Between Pulo Mangkasar and the head of the bay there are reefs as charted.

- 40 Silabulabu river and village are situated in the northern bight of the roadstead; water may be procured.

Anchorage.—The best anchorage is in depths of from 10 to 11 fathoms, northward of the north point of Pulo Mangkasar.

General chart 2761.

Chart 2761, Chingkok bay to Strait of Sunda.

Batu Mongo bay and village lie southward of Silabulabu bay, with Vogelneshes point, the only projecting one on the west coast, between; from thence to Tanjong Batu, the south extreme of North Pagi, the coast is rocky, upon which the sea breaks heavily. 5

Northward of Silabulabu bay, to Tanjong Sumombi, black rocks, above water, are charted in places, with a shoal extending from the point. Heavy breakers are always seen on the whole of the west coast.

A bank, with 7 fathoms least water, about 4 cables in extent, 10 lies about $2\frac{1}{2}$ miles northward of Tanjong Simiayu with the north extreme of North Pagi bearing 87° true.

From Tanjong Simiayu, off which a reef extends a short distance, the coast trends north-eastward to the north extreme of North Pagi.

A number of islets and rocks are charted as extending nearly 7 miles 15 south-west of Tanjong Batu.

Plan of Sikakap strait on 2761.

SIKAKAP STRAIT, separating the Pagi islands, is about 7 miles in length in a north-east and south-west direction, and less than half a mile in breadth in its narrowest part. There are several 20 islands in the strait, and reefs fringe the shores, but nevertheless it offers a safe passage.

Pulo Ti Nussa (*Lat. $2^\circ 49'$ S., Long. $100^\circ 9'$ E.*), at the south end of the strait, is separated from North Pagi by a channel with a depth of from 5 to 10 feet, fronting which there is a small island, having a 25 rock upon it resembling a thatched house when viewed from the south-westward. The sea breaks with great violence upon the rock, and upon the low rocky shore to the westward.

DIRECTIONS.—From the westward.—The passage from the south-westward is between Pulo Ti Nussa and the Siopa 30 islets, by keeping in mid-channel, and thence westward of Pulo Mashuchu, which is low and wooded, and Pulo Bakot Pegu, where the depths are from 5 to 15 fathoms; the northern side of the strait is high, densely wooded, and has tall trees. There is a rock in the channel eastward of Pulo Bakot Pegu, and a few others near the shore 35 of South Pagi. Pulo Tongo, in the eastern entrance, is high, and nearly joined by reefs to South Pagi island; the channel, therefore, is northward of Pulo Tongo, where the depths are from 17 to 30 fathoms. Pulo Kechil, a rock above water, with a fringing reef, lies one mile eastward of Pulo Tongo; rocks are charted about a quarter of a mile 40 eastward of Pulo Tongo.

Pulo Sama (*Lat. $2^\circ 43'$ S., Long. $100^\circ 14'$ E.*), near the shore, at about a mile northward of Pulo Tongo, is steadily becoming submerged, and is only a sandbank just above high water. It

General chart 2761.

Plan of Sikakap strait on 2761. Var. nil.

was an island overgrown with shrubs only a few years back, while 40 years ago it was a high pointed rock, which marked the eastern entrance to the strait. Discoloured water, probably marking a shoal under 5 fathoms, has been reported at $1\frac{1}{2}$ cables eastward of it.

The bay between Pulo Sama and the entrance to the strait is choked with rocks.

Tekakap river, on the northern shore of the strait, where fresh water may be procured, is abreast Pulo Bakot Pegu; the village of that name is about 2 hours' row up the river, which has a depth of 12 feet at its mouth, and from 10 to 18 feet up to the village, where there is a depth of 9 feet. There is also fresh water under the high land at the south-east point of North Pagi.

The trees in Sikakap strait are suitable for spars; they are also cut into planks by the natives for the Padang and Benkulen markets.

From the eastward.—Sikakap strait is not easily made out from the eastward; it is better to steam along the coast until the strait lies open, and the islands at the entrance are seen detached from the shore.

Gunong Indrapura in Sumatra bearing 45° true astern leads to the entrance, which is between Pulo Tongo and North Pagi, thence reversing the directions given as from the westward. See views *c* and *e* on page 392.

Anchorage.—The small bays on either side, with moderate depths of water, afford anchorages out of the strength of the tidal streams.

The Dutch war vessel *Java* anchored to the eastward of Pulo Bakot Pegu in a depth of 13 fathoms.

Takeli village is situated on a small river, nearly a mile further eastward, and is about a quarter of an hour's row from the mouth. The inhabitants of both villages went on board the vessel in great numbers and unarmed.

Tidal streams.—The tidal streams run at rates of from $1\frac{1}{2}$ to 2 knots an hour.

Chart 2761, Chingkok bay to Strait of Sunda.

SOUTH PAGI ISLAND is about 38 miles in length by 10 miles in breadth, with several small islands near the coasts. In many places they lie so close to the shore that they are not easily distinguished. It is not easy to find anchorage, as 30 fathoms, no bottom, will generally be found at 2 cables off-shore. Its hilly interior offers no conspicuous peaks. In several places where the land is low it abounds with cocoanuts; some small spots have been planted with pepper vines. The west coast of South Pagi is not known. The islands Sibar Baru lie close off its west side in lat. $3^\circ 0'$ S., and that of Sibar westward of its south point.

General chart 2761.

Chart 2761, Chingkok bay to Strait of Sunda. Var. nil.

The east coast from Sikakap strait trends south-eastward for about 22 miles to Tanjong Sebalua, just northward of Labuan Jau road, fronted by islets and reefs to a short distance, as charted; about midway between is Simapopo village. 5

A shoal, with a least depth of 2 fathoms on its southern end, lies about 9 miles north-eastward of Tanjong Sebalua, with Java point in line with the north extreme of Pulo Tinope, and the west side of Jau island bearing 159° true.

Plan of Labuan Jau road on 2761. 10

Labuan Jau road (Lat. $3^{\circ} 4' S.$, Long. $100^{\circ} 29' E.$), on the eastern side of South Pagi, is an open anchorage with depths of 12 to 13 fathoms, over mud, at about 2 cables off-shore.

Plan of Vekens bay on 2761.

VEKENS BAY (Lat. $3^{\circ} 7' S.$, Long. $100^{\circ} 26' E.$), known to the natives as Guguh Baturei, on the south-east side of South Pagi, lies within Pulo Tinopo, which fronts its entrance; it is about 6 miles in length by from one mile to 3 miles in breadth, and the soundings gradually decrease from 25 fathoms near its centre towards its head, where there are depths of 5 to 8 fathoms. It is the only sheltered anchorage on the east coast of South Pagi. The Netherlands surveying vessel *Java* discovered this harbour in 1889, and went in by the northern entrance, which is about three-quarters of a mile wide, with depths of 11 to 16 fathoms. 15 20

Reefs in the approach (*chart 2761*).—A small patch of $1\frac{1}{2}$ fathoms lies in the approach, with Tanjong Sebalua bearing 296° true, distant about 2 miles, and the north extreme of Pulo Messing Ani in the entrance bearing 210° true. 25

Patches of 6 feet exist at $2\frac{3}{10}$ miles, 56° true, and $1\frac{8}{10}$ miles, 83° true, from the easterly rock on Lannup reef, which is in lat. $3^{\circ} 7' S.$, long. $100^{\circ} 27\frac{1}{2}' E.$ 30

A large reef lies $2\frac{1}{2}$ miles eastward of Tanjong Java and 2 miles north-east of Pulo Tinopo.

The bay is easily navigated, as the reefs are marked by breakers or by discolouration. For the dangers in the bay, *see* the plan; others may exist. 35

A number of streams discharge into the head of the bay.

Supplies.—Baturuwi village is situated in a creek at the head of the bay, north-westward of Pulo Verdam; water, fowls, and pigs may be obtained here. 40

Anchorage.—There is anchorage, in a depth of about 15 fathoms, at about half a mile off the centre of the west coast of Pulo Tinopo, and towards the head of the bay about 6 cables westward of Pulo Neumann, in about 10 fathoms, over mud, with the extremes of the island bearing 50° true and 90° true. 45

General chart 2761.

Chart 2761, Chingkuk bay to Strait of Sunda.

Coast.—Anchorage.—Between this bay and the south-east point of South Pagi, temporary anchorage may be taken off some of the small villages, where the depths appear to be moderate.

- 5 **Tides.**—The tide among the Sipora and Pagi islands rises from 3 to 5 feet at springs, and is less than half that amount at neaps; the streams are affected by currents caused by the prevailing wind, and are always weak.

- 10 **Suman and Mongo** are islands situated 2 and 5 miles, respectively, south-eastward of the south entrance point of Vekens bay; the latter island is high.

Samuel reef (*Lat. 3° 16' S., Long. 100° 35' E.*), showing discoloured water, is reported to lie with Pulo Mongo, 313° true, distant 1½ miles.

- 15 **Pulo Sandion** (Sanding), lying 14 miles south-eastward of South Pagi, is low and encircled by a reef extending for a distance of 2 miles from the shore, except on the west side where it is half a mile broad. A small round islet, with trees, lies one mile from the north-east side of Sandion, on the reef which surrounds that island.

- 20 **Europa reef** (*Lat. 3° 30' S., Long. 100° 31' E.*), of coral, lies 11 miles westward of Pulo Sandion. The *Europa* (in 1797), steering east-south-east to pass southward of Sandion, obtained soundings in 33 fathoms, soon shoaling to 4 fathoms, when the course being altered to south-west the water deepened in half an hour to 65 fathoms, with
25 no bottom. When in 4 fathoms, the east point of Sandion bore 79° true, about 9 miles distant. The Netherlands chart gives the least depth on the reef as 7 fathoms.

- The *David Scott*, in 1825, found a depth of 25 fathoms hard bottom, with the centre of Sandion bearing 330° true, distant 10 miles; being
30 nearly calm, a boat was sent to sound a distance of 2 or 3 cables from the vessel, and found the same depth. As other coral spots may probably exist in the vicinity of Sandion, it seems prudent to give this island a good berth on all sides. Addington strait, the channel between Sandion and South Pagi, is reported to be safe.

- 35 **TRIESTE ISLAND, or Pulo Mega** (*Lat. 4° 0' S., Long. 101° 1' E.*), situated 37 miles south-eastward of Sandion island, is 3 miles in length, surrounded by a reef, and should be visible from a distance of about 15 miles in clear weather. A coral bank with depths of from 25 to 30 fathoms stretches 4 or 5 miles off the north,
40 east, and west sides of the island, on which a sailing vessel may anchor, if drifted near by the current during calm weather. Some fresh water may be procured upon the island in the rainy season. See view *d* on page 460.

General chart 2761.

Chart 2761, Chingkuk bay to Strait of Sunda. Var. nil.

Anchorage may be obtained in a depth of 12 fathoms, over sand and coral, about half a mile off the east coast, abreast which there is a good landing place, in spite of the high surf about the island.

ENGANO, or Telanchang.—General remarks.— 5
Aspect.—Engano, the southernmost of the large islands fronting the west coast of Sumatra, and distant from it 60 miles, is 19 miles in length and about 10 miles in breadth. A range of hills runs through the island from north-west to south-east, with an average height of about 600 feet, but isolated peaks rise to a height of 1,000 10
to nearly 1,200 feet.

There are no expanses of plain, as the spurs of the hills extend nearly everywhere down to the sea, especially on the south-west and south sides. Bearing about 56° true the island, on approaching it, appears as two hills, and is visible from about 30 miles. 15

It is densely wooded, unbroken by a field of grass or a trace of cultivation; it cannot be said to have a beach, as the trees reach to and overhang it. A quantity of cocoanut trees are seen along the coasts; the sea breaks furiously on the drying coral reefs, with which the island is surrounded. There are heavy breakers on the reefs even in 20
the calmest weather, making landing impossible except at one or two points mentioned later. See view *e* on page 460.

Black rock, 8 feet high, lies about one mile off Tanjong Kenemei (Labuhu), the south point of the island, eastward of the south extreme of the reef extending from it. 25

Surf has been seen $3\frac{1}{2}$ miles east-south-eastward of the point.

There are no roads on the island and the marshy interior is difficult to penetrate, and produces fever; communication between the villages is effected by boats. There are a number of streams throughout the island, and wild pigs and birds exist. The island forms part of 30
Benkulen province; the climate is like that at other islands in the neighbourhood, but the constant sea breezes keep it from ever being very warm.

Population.—Trade.—The population numbered 3,000 in 1862, but malaria and phthisis had reduced it to a few hundreds (400 35
in 1908), many of whom are Christians. The inhabitants hunt and fish, but land cultivation is in a primitive state. They are friendly and peaceable. The chief exports are cocoanuts, rattan, various valuable woods, and rope made from the bark of the bagu tree.

Plan of Engano bay on 2761.

Engano bay (Lat. $5^{\circ} 28' S.$, Long. $102^{\circ} 22' E.$), the principal anchorage, is on the east side of the island, and has in its entrance three small islands surrounded by reefs, which always break heavily. 40

General chart 2761.

Plan of Engano bay on 2761. Var. nil.

North island, or Aduwe, is inhabited, covered with trees, and has a flagstaff on its west point; excepting a small opening on the west side it is surrounded by a coral reef of considerable extent, partly dry at low water, but having depths of 4 to 7 fathoms close-to.

A reef, with $3\frac{1}{2}$ fathoms least water, lies about half a mile, 247° true, from North island, and about 4 cables, 290° true, from the reef there is a coral patch on which the depth is $3\frac{1}{4}$ fathoms.

South island, or Kaupanu, distant $1\frac{1}{2}$ miles from North island, is also covered with trees, and surrounded by a reef, which on the western side extends but a short distance. There is a deep, narrow, passage apparently between South island reef and that which extends one mile south-eastward of Tanjong Kowabi.

Middle island or Kaperuru, the smallest of the three, is conspicuous from the sea, having a high sandy beach, with a tuft of trees near the centre. It is situated on the outer detached reef which lies off Tanjong Euma (Eumo), the north-east point of the head of the bay, with apparently no passage between; the reef extends about a quarter of a mile eastward of Middle island.

Buoy.—A red conical buoy is moored about $1\frac{1}{2}$ cables off the edge of the reef on the north-west side of North island.

Settlement.—The residence of the Dutch magistrate in charge is on North island; Kifajuk village, situated on Engano, abreast North island, is some distance inland.

Communication.—The Netherlands Royal Packet Company's steamers from Batavia to Padang call here once every three months.

Supplies.—At the head of the bay fresh water may be obtained from the Sungi Okia. The island abounds with good timber, fish, yams, and cocoanuts.

Landing is difficult in most parts of the bay. There is a depth of about 2 fathoms in the channel for boats between the reefs leading to the village.

Anchorage.—The best and quietest anchorage is 327° true, distant about a third of a mile from the west point of North island, in a depth of 14 fathoms, over sand. There is also anchorage between South and Middle islands in depths of from 9 to 18 fathoms, over sand, north-westward of South island; both these are fairly sheltered anchorages. Patches of 5 fathoms are charted northward of Middle island.

Directions.—Most of the following remarks are gathered from the chart, and must be used with considerable caution:—The channel apparently now used is that northward of North island, and has depths of from 8 to 12 fathoms. The channel leading into Engano

General chart 2761.

Plan of Engano bay on 2761. Var. nil.

bay, between North and South island, has depths of about 12 fathoms coral, in mid-channel.

Chart 2761, Chingkuk bay to Strait of Sunda.

Malakonai anchorage is on the north coast of the island, 5
north-east of the river which falls into the sea at that point, with Tanjong Beuwa, the east point of the bay, bearing 109° true, and Tanjong Hubua, the west point, 303° true.

From this anchorage a reef named Gosong Manuhu, steep-to, was seen near the shore, distant about half a mile, and bearing 300° true. 10

Westward of Malakonai anchorage the coast reef extends further off-shore, and at Tanjong Kiofafa, the north point of the island, to about one mile off, and from thence south-westward to Tanjong Komang.

Plan of Barohia anchorage on 2761.

Barohia anchorage (Lat. $5^{\circ} 18' S.$, Long. $102^{\circ} 8' E.$), a little westward of the north point of Engano island, is a narrow inlet in the fringing reef, extending east and west nearly 8 cables, and having in mid-channel a depth of 6 to 8 fathoms, except near the head, where there are shallow patches of 3 and 4 fathoms near the landing place. 20
This anchorage is not safe in the westerly monsoon period.

Praus can navigate Sungi Barohia nearly to its source.

Tides.—It is high water, full and change, at about VIh. 30m. near Barohia; springs rise about 3 feet.

Chart 2761, Chingkuk bay to Strait of Sunda.

Kahek or Satu.—On the south-west side of Engano, in a small bay between Pulo Kahek and the shore, there is anchorage for small craft in about 10 fathoms, sand bottom, with the south extreme of the island bearing about 281° true, distant 3 cables, and Dadauwe village about 338° true. The passage between the island and the point of the bay is 4 cables wide, but the reefs extending from both shores reduce it to about 2 cables, with depths of 5 to 6 fathoms on either side of a 2-fathoms patch in the fairway. The east shore of the bay is fronted by a reef to the distance of 2 cables. 30

St. Mary rock, on which the s.s. *St. Mary*, of 17 feet draught 35
of water, struck in 1900, lies with Kowabi point bearing 357° true, distant $6\frac{1}{2}$ miles, and Tanjong Kenemei or Labuhu 305° true.

General chart 2761.

APPENDIX I.

SINGAPORE PORT REGULATIONS.

RULES FOR THE PORT OF SINGAPORE MADE BY THE GOVERNOR IN COUNCIL UNDER SECTIONS 392, 428, AND 435 OF "THE MERCHANT SHIPPING ORDINANCE 1910" AND APPROVED BY RESOLUTION OF THE LEGISLATIVE COUNCIL ON THE 31ST MAY, 1912.

5 (*Articles 20-27 inclusive apply to all ports of the Straits Settlements.*)

1. These Rules may be cited as "The Singapore Port Rules, 1911," and shall apply only to the Port of Singapore.

In these Rules:—

10 "Collision regulations" means the regulations for the prevention of collisions at sea under section 418 of "The Merchant Shipping Act, 1894."

"Boat" means a boat licensed under section 427 of "The Merchant Shipping Ordinance, 1910."

Man-of-War Anchorage.

15 2. The anchorage reserved for "Men-of-War" shall be with Fort Canning flagstaff open northward of the Victoria Memorial Hall, 307° true, and no merchant-vessel shall anchor so as to swing within 50 fathoms of this bearing except with the permission in writing of the Port Officer.

Quarantine Anchorage.

20 3. The quarantine anchorage shall be to the northward of and within one mile and a quarter of Peak island, with the centre of Peak island between the bearings of 202° true and 151° true.

Explosives Anchorage.

25 4.—(a) The anchorage for vessels loading or loaded with explosives shall be off Pasir Panjang, half a mile westward of Tanjong Berlayer and such vessels shall not anchor or berth elsewhere within port limits except with the permission in writing of the Port Officer.

30 (b) Vessels carrying, loading, or discharging explosives shall hoist the International code signal "Flag B" at the mast-head; and at night a red light in the same place.

Dangerous Petroleum Anchorage.

35 5. The anchorage for vessels carrying dangerous petroleum (flash point below 73° Fahrenheit) shall be westward of Blakang Mati island, and southward of a line drawn from the north-west point of Pulau Bukum to Mount Imbia (Blakang Mati island). Such vessels

shall not anchor or berth elsewhere within port limits except with the permission in writing of the Port Officer.

Native Craft Anchorage.

6. The anchorage for all junks and native vessels of every description shall be that part of the roads which lies north of Raffles Institution. 5

Vessels Laying Up, Etc.

7. No vessel undergoing repairs or laying up shall occupy a loading or discharging berth.

Regulating Traffic, Keeping Free Passages, Etc. 10

8. A free passage way, not less than two cables in width, shall be kept off each end of the South Mole. No vessel shall anchor in or otherwise obstruct such passage way.

8A.—(1) No boat in waters situated inside the South Mole shall cause any impediment or obstruction to the free navigation of steamers. 15

(2) Subject to the provisions of the preceding sub-section, it shall be lawful for boats, for the purpose of loading or unloading to make fast alongside any steamer in waters situated in the inner harbour within the line of the South Mole in lines not exceeding the length of the steamer and in ranks not exceeding four boats abreast. 20

8B.—No vessel shall enter any area prohibited by the Port Officer by notification in the *Gazette*, except on the condition (if any) set out in the said notification.

9. No vessel or raft shall anchor in the fairway through Keppel harbour except in case of emergency, or with the permission in writing of the Port Officer. 25

9A.—Every vessel navigating in Keppel harbour shall proceed at slow speed, or at such reduced speed as will not endanger life or property belonging to or adjacent to any wharf or dock. 30

10. All small craft and rafts navigating in Keppel harbour shall keep out of the way of steamers, and should they have to anchor shall do so well in shore.

11. No vessel shall anchor in or otherwise obstruct the fairway of any river within port limits or make fast to or under any bridge. 35

12. Free passages shall be kept to all piers, jetties, wharves, landing places, docks, rivers, and moorings, and all vessels and rafts shall move without delay when so directed by the Port Officer, or any police officer. A clear space of 20 fathoms shall be preserved in front of and around all landing places, except those situated on the bank of a river. 40

13. No vessel shall anchor so as to swing within 50 fathoms of Johnston's pier.

14. Vessels propelled by steam, electricity, or other mechanical power when navigating rivers or channels, or going alongside any

jetty, pier, ladder, dock entrance, wharf, or alongside any ship shall go at a slow rate of speed.

15. No vessel (unless in the employ of Government) shall come alongside any public stairs or pontoons until the persons for whom she is waiting arrive.

16. No vessel shall remain at any public stairs or pontoons or alongside any jetty or landing place longer than is necessary except with the permission of the Port Officer.

17. No passenger shall land, and no person in charge of any launch, boat, or sampan, shall set down any passenger, or the baggage of any passenger or other person, between Tanjong Pagar East Wharf and the obelisk at Tanjong Katong except at the following places, namely :

Between Teluk Ayer Fish Market and Finlayson Green.

Johnston's Pier.

15 Treasury steps (Singapore River).

Middle Road (by Volunteer Drill Hall).

Arab Street steps (at Clyde Terrace).

For the purposes of this Rule the expression "passenger" shall include every person conveyed or being conveyed to the shore in any launch, boat, or sampan (not being the master or a member of the crew thereof), from on board any vessel within or without the limits of the port, except from on board any vessel lying in the Singapore River or in the area to the north of a line joining Tanjong Rhu and Clyde Terrace Market.

18. No person shall board any ship arriving or arrived alongside any wharf, pier, or jetty until such ship is properly secured alongside, nor otherwise than by the gangway or other regular means provided for the purpose.

19.—(1) (a) No person shall loiter on Johnston's Pier or the Master Attendant's Pier.

(b) No person shall tout for hire, sell, hawk, or peddle on either of the above-mentioned piers.

(2) Any person found contravening this rule shall immediately leave the pier when so directed by any police officer or officer of the Marine Department.

Making Fast to Buoys, Etc.

20. No person shall make fast any vessel or raft to any buoy or beacon.

21. Vessels alongside wharves or piers are required to attend to their securing hawsers especially when other vessels are passing, and at the rise and fall of the tide.

Steam Whistle, Syren, Etc.

22. No steam whistle, syren, or other like instrument shall be used within port limits except as a signal of danger or in conformity with the collision regulations.

Vessels Departing.

23. The master of every steamship about to depart from the port shall cause the Blue Peter (Flag *P*) to be hoisted at least two hours during daylight before the time of sailing, or if this is not practicable as long before departure (during daylight) as may be possible. 5

Boarding of Vessels and Information to be Given.

24.—(1) The master of every vessel boarded by a Port Officer shall fill up correctly and sign the form in the book handed to him, giving at the same time a correct list of all passengers, and a report of any casualties, accidents, or deaths that have occurred during the voyage. 10

(2) The *nakhodas* of all native craft shall report the arrival of their vessel to the Port Officer, and shall make declaration as to their cargo and passengers and whether any casualty, accident, or death has happened during the voyage.

(3) In the event of any casualty or accident or of the death of any member of the crew, passenger, or other person occurring on board any vessel whilst in the port or in case of the desertion or removal of any of the crew, the master shall forthwith report the same in writing to the Port Officer. 15

Search Lights, Projectors, Etc.

25. No captain or master of any vessel, British or foreign, whether vessel of war, transport, or merchant ship, shall within port limits permit any search light or projector of any description to be used or exhibited on board such vessel without the permission of the Master Attendant. 20

This rule shall not apply to any vessel belonging to or in the service of His Majesty. 25

Fires on Board.

26.—(1) In case of fire breaking out on board any vessel within the port— 30

By day.—The master shall hoist the code flags *N M* at the main and keep the ship's bell ringing until assistance arrives. A gun should be fired if possible.

By night.—The master shall fire a gun if possible, burn blue light, send up rockets, and keep the ship's bell ringing until assistance arrives. He shall also hoist a green light over a red light at peak or mast-head, such lights being at least 10 feet apart. 35

(2) The master shall cause any powder, spirits, or other explosive or inflammable substance which may be on board to be taken out of the vessel as soon as possible after the fire is discovered. 40

(3) The master of any vessel in which fire takes place shall obey or cause to be obeyed such orders as may be given him by the Port Officer.

Soldiers and Sailors of Foreign Powers.

27.—(1) No armed soldier or sailor in the service of any foreign power shall land in the port without the permission of the Colonial Secretary.

- 5 (a) Provided that this shall not apply to officers landing armed for purposes of ceremony or funerals; and
- (b) Permission will usually be given as a matter of course for the landing of armed firing parties when required for funerals.
- 10 (2) Where one or more vessels of war or transports in the service of a foreign power are in the port, unarmed sailors employed in such ships of war or transports may land without further permission, until the contrary is expressed by the Colonial Secretary to the Consular Officer of that Power, but where bodies of sailors for reliefs, exceeding one hundred per transport, are conveyed by such transports, they may
- 15 not land (even unarmed) without the permission of the Colonial Secretary.

(3) Where one or more vessels of war or transports in the service of a foreign power are in the port, no unarmed soldiers therefrom shall land without the permission of the Colonial Secretary.

- 20 (4) A permission to land in pursuance of this rule shall be in writing, and shall be subject to conditions to be expressed in such permission for regulating and controlling the movements on shore of the persons permitted to land, and any breach of such conditions will render the permission null and void in respect of the person or persons
- 25 committing such breach.

(5) For the purposes of this rule a steamer conveying upwards of one hundred soldiers or sailors in the service of a foreign power is to be deemed a "transport."

Singapore River.

- 30 General regulations for Singapore river, &c., will be found with the complete rules for the port, obtained at the port.

APPENDIX II.

PARTICULARS OF DRY DOCKS, PATENT SLIPS, &c.

Port.	Name of Dock.	Length.		Breadth of Entrance.	Depth at M.H.W.S.			Springs rise.	Lifting Power.	Date Built.	Remarks.
		On Blocks.	Over all.		Feet	On Sill.	Feet				
Sabang	Floating	—	286	69	Feet	—	18	Feet	Tons	—	For steam vessels up to 360 feet in length, and 18 feet draught.
Penang	Prye river	332	345	50	14½	Forward	14½	6½	—	1878	
	Patent Slip	90	—	—	Aft	7	3½	—	100	—	
	"	100	—	—	Forward	6	16	—	350	—	
Singapore	"	(Cradle)	—	—	Aft	Forward	16	—	350	—	There is an inner caisson chamber by which a length of 497 feet can be obtained when desired.
	"	75	—	—	Aft	16	16	—	350	—	
	King's Dock	859	865	99	34	34½	8½-10½	—	—	1914	
	Victoria	450	463	64	20	20	20	—	—	—	
	Albert	469½	477½	59	21	21	21	—	—	1879	
	Keppel Harbour dock,	387	396	47½	14	14	14	—	—	1857	
	No. 1	444	463	64	17	17	17	—	—	1868	
	No. 2	—	—	—	Forward	8	8	—	500	1887	
	Tanjong Ru— Patent Slip, No. 1 ..	175	—	—	Aft	12	12	—	100	1886	
	" No. 2 ..	90	—	—	Forward	4	4	—	150	—	
	" No. 3 ..	125	—	—	Aft	7	7	—	180	—	
	United Engineers— Slipway, No 1	104	—	—	Forward	4½	4½	—	350	—	
	" No. 2	152	—	—	Aft	7½	7½	—	—	—	
	" No. 2	(Cradle)	—	—	Forward	5½	5½	—	—	—	

APPENDIX III.

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS
OF DEPTHS, &c.

Port.	Depth at M.L.W.S. in channel of approach.	Depth at M.L.W.S. in anchorage.	Rise of Tide.		REMARKS.
			Spgs.	Nps.	
Malacca	Fathoms. Deep	Fathoms. 10 to 12	11	8½	A bar with 3 fms. halfway up to anchor- age.
Olehléh	—	5	5	—	
Penang	North ent., 4½ South ent., 4	6 to 12 —	6½ —	4½ —	
Sabang	—	15 to 20	7	4½	
Keppel harbour, Singapore	West ent., deep East ent., 6	*	8-10	6-8	*All Vessels go alongside the wharves.
Singapore road	Deep	7 to 10	8-10	6-8	Bar with a least depth of 26 feet in dredged channel.
Swettenham, port	Deep	6	13½	9½	

APPENDIX IV.

LIST OF PLACES SUITABLE FOR MAGNETIC
OBSERVATIONS.

Place.	Position.
PENANG	Observation spot, 22 yards north of north-west corner of municipal buildings. Lat. $5^{\circ} 24' 35''$ N. ; long. $100^{\circ} 20' 33''$ E.
SINGAPORE	On summit of a ridge, 175 yards N. 73° W. (true) from Mount Faber flagstaff, sand and granite soil. Lat. $1^{\circ} 16' 18''$ N. ; long. $103^{\circ} 49' 14''$ E.

LOCALITIES IN WHICH ABNORMAL VARIATION OF THE COMPASS
HAVE BEEN REPORTED TO EXIST:—

Nil.

APPENDIX V.

PLACE—PENANG. OBS. Δ . LAT. $5^{\circ} 34' N$, LONG. $100^{\circ} 20' E$. Height above *M.S.L.*, 17 feet.
METEOROLOGICAL TABLE COMPILED FROM 8 TO 13 YEARS' OBSERVATIONS. (1901-1913.)

MONTH.	BAROMETER At 32° F., Mean Sea Level.				AIR TEMPERATURE						Relative Humidity			RAIN.			Mean Force, Beaufort Scale.	WIND.								No. of Days Gale.	No. of Days Force		
	For Month.	Daily Range.	Absolute.		Mean.			Absolute.			Range.	No. of Days.	Total Fall.	Max. Fall in 24 hours.	Number of Days from														
			Max.	Min.	Range.	Max.	Min.	Range.	N.	N.E.					E.	S.E.		S.	S.W.	W.	N.W.	Calm.							
January	Ins.	Ins.	Ins.	Ins.	°	°	°	°	°	°	°	Ins.	Ins.	2-70	2-7	9	6	1	2	2	1	0	9	1	—	—			
February	—	—	29-95	29-63	0-32	81	90	73	17	94	68	26	73	1	3-70	7	2-70	2-7	6	5	1	2	3	0	10	1	—		
March	—	—	29-94	29-40	0-54	82	91	73	18	96	67	29	72	1	2-59	6	1-90	2-7	5	1	2	3	0	11	1	—			
April	—	—	29-94	29-62	0-32	83	92	74	18	97	69	28	73	1	3-89	9	2-72	2-6	5	6	2	3	3	0	11	1	—		
May	—	—	29-93	29-55	0-38	83	91	75	16	95	70	25	76	2	7-18	14	4-66	2-6	3	5	2	4	5	0	1	9	1	—	
June	—	—	29-93	29-61	0-32	83	90	75	15	98	70	28	77	2	9-71	14	3-83	2-5	2	4	2	5	7	0	1	9	1	—	
July	—	—	29-94	29-59	0-35	82	90	74	16	95	68	27	76	2	8-62	12	5-65	2-6	3	4	1	7	7	0	0	7	1	—	
August	—	—	29-94	29-62	0-32	82	90	74	16	93	70	23	77	2	6-29	12	2-86	2-5	3	4	2	6	7	1	1	6	1	—	
September	—	—	29-93	29-44	0-49	81	89	74	15	95	70	25	78	3	11-21	15	6-61	2-5	3	5	2	6	7	0	0	7	1	—	
October	—	—	29-94	29-59	0-35	81	88	74	14	93	70	23	79	3	14-41	17	8-50	2-7	3	5	2	5	5	0	0	9	1	—	
November	—	—	29-93	29-64	0-29	81	88	73	15	92	63	29	78	4	16-85	22	6-91	2-6	3	5	2	5	4	0	1	10	1	—	
December	—	—	29-96	29-65	0-31	81	88	73	15	92	68	24	78	3	12-62	19	7-03	2-7	5	5	2	3	2	0	1	11	1	—	
Means	—	—	29-94	29-63	0-31	81	88	74	14	92	69	23	76	2	5-42	10	2-98	2-7	7	7	1	1	1	1	0	12	1	—	
Totals	—	—	—	—	—	82	90	74	16	—	—	—	76	2	—	—	—	2-6	—	—	—	—	—	—	—	—	—	—	
Absolute Values	—	—	29-96	29-40	0-56	—	—	—	—	98	63	35	—	—	102-49	157	8-50	—	52	61	20	49	53	3	5	110	12	—	
No. of Yrs'. Obsns.	9	—	13													8	11											—	—

Authorities :—Memoirs of Indian Meteorological Department, Vol. 22.
Straits Settlements, Meteorological Returns.

Meteorological Office,
June 16th, 1915.

PLACE—BUKIT MERTAJAM (FOR PERAK). OBS. Δ . LAT. $5^{\circ} 21' N$, LONG. $100^{\circ} 28' E$. Height above M.S.L., 65 feet.
METEOROLOGICAL TABLE COMPILED FROM 5 TO 13 YEARS' OBSERVATIONS. (1901-1913.)

APPENDIX.

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MONTH.	BAROMETER At 32° F., Mean Sea Level.				AIR TEMPERATURE.						RELATIVE HUMIDITY Scale 0 to 10.		RAIN.			WIND.								No. of Days Gale.	No. of Days Force.						
	Mean.		Absolute.		Mean.			Absolute.			Cloud Amount.	Total Fall.	No. of Days.	Max. Fall in 24 hours.	Mean Force, Beaufort Scale.	Number of Days from															
	For Month.	Daily Range.	Max.	Min.	Range.	Max.	Min.	Range.	N.	N.E.						E.	S.E.	S.	S.W.	W.	N.W.	Calm.									
January	Ins.	Ins.	Ins.	Ins.	°	°	°	°	°	%	Ins.	Ins.	9	3.50	—	3	3	0	0	0	0	4	4	4	7	10	—	—			
February	—	29-83	—	30-00	29-69	0-31	82	92	72	20	99	66	33	76	4	6-25	9	5-40	7	5-40	—	2	1	0	0	1	4	3	6	11	—
March	—	29-84	—	30-01	29-69	0-32	83	93	73	20	101	67	34	73	4	5-76	7	4-30	11	4-30	—	1	1	0	1	1	4	2	7	14	—
April	—	29-82	—	29-95	29-54	0-41	84	94	74	20	101	69	32	74	4	8-55	11	4-17	16	4-17	—	2	1	0	1	1	4	1	7	13	—
May	—	29-81	—	29-99	29-62	0-37	84	93	74	19	100	68	32	77	4	9-72	16	5-20	14	5-20	—	3	1	0	0	1	5	2	7	12	—
June	—	29-80	—	29-95	29-65	0-30	84	93	74	19	100	69	31	77	5	9-53	14	4-40	10	4-40	—	3	1	0	0	2	5	3	5	11	—
July	—	29-80	—	29-97	29-68	0-29	83	93	74	19	99	70	29	76	4	8-05	10	5-10	9	5-10	—	4	1	0	0	1	5	1	7	12	—
August	—	29-80	—	29-93	29-67	0-26	83	93	74	19	100	66	34	76	4	6-65	9	6-37	12	6-37	—	3	1	0	1	2	7	1	5	11	—
September	—	29-80	—	29-94	29-64	0-30	83	92	74	18	100	67	33	76	5	9-91	15	13-80	16	13-80	—	3	2	0	0	1	6	1	8	9	—
October	—	29-82	—	29-97	29-68	0-29	82	91	73	18	98	68	30	78	5	13-48	21	5-50	21	5-50	—	3	2	0	0	1	7	1	7	10	—
November	—	29-84	—	30-00	29-65	0-35	81	90	73	17	97	67	30	79	5	18-28	19	6-20	19	6-20	—	3	2	0	0	1	7	1	8	11	—
December	—	29-83	—	29-98	29-64	0-34	81	90	72	18	96	67	29	80	5	15-96	13	8-75	13	8-75	—	3	2	0	0	1	4	1	8	11	—
	—	29-83	—	29-97	29-64	0-33	81	90	72	18	97	68	29	78	5	8-14	13	—	—	—	—	2	5	0	0	0	3	1	9	11	—
Means	—	29-82	—	—	—	—	83	92	73	19	—	—	—	77	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120.28	156	—	—	—	—	32	21	0	3	12	58	21	83	135	—
Absolute Values	—	—	—	30-01	29-54	0-47	—	—	—	—	101	66	35	—	—	—	13-80	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of Yrs. Obsns.	8-9	—	8-9			—	13			—	13			—	—	—	—	—	—	—	—	5						—	—		

Meteorological Office,
June 16th, 1915.

Authority :—Straits Settlements, Meteorological Returns.

PLACE—MALACCA. OBS. Δ. LAT. 2° 12' N., LONG. 102° 14' E. Height above M.S.L., 23 feet.
METEOROLOGICAL TABLE COMPILED FROM 5 TO 13 YEARS' OBSERVATIONS. (1901-1913.)

MONTH.	BAROMETER At 32° F., Mean Sea Level.				AIR TEMPERATURE.						Relative Humidity.			RAIN.			WIND.										No. of Days Gale.	No. of Days Force.			
	Mean.		Absolute.		Mean.			Absolute.			Range.			Total Fall.	No. of Days.	Max. Fall in 24 hours.	Mean Force, Beaufort Scale.	Number of Days from													
	For Month.	Daily Range.	Max.	Min.	Range.	Max.	Min.	Range.	Max.	Min.	Range.	N.	N.E.					E.	S.E.	S.	S.W.	W.	N.W.	Calm.							
																									Ins.	Ins.	Ins.	°	°	°	°
January	-	29-80	-	30-00	29-65	0-35	80	89	72	17	93	65	28	90	4	3-57	8	4-45	-	12	7	1	2	1	1	1	1	6	0	-	-
February	-	29-80	-	29-98	29-68	0-30	80	89	72	17	93	63	30	89	4	3-83	6	5-76	-	8	6	1	2	3	2	2	2	4	0	-	-
March	-	29-81	-	29-94	29-62	0-32	81	89	72	17	95	65	30	88	4	3-95	8	3-80	-	8	6	0	3	3	3	2	6	0	-	-	-
April	-	29-80	-	29-95	29-65	0-30	81	90	72	18	95	67	28	91	5	7-75	13	4-00	-	7	5	1	1	3	3	3	7	0	-	-	-
May	-	29-80	-	29-95	29-63	0-32	80	88	73	15	98	67	31	91	5	7-15	13	3-95	-	6	4	0	3	2	4	3	9	0	-	-	-
June	-	29-78	-	29-95	29-49	0-46	80	89	72	17	96	67	29	91	5	7-06	11	5-10	-	3	3	1	4	3	4	4	7	1	-	-	-
July	-	29-79	-	29-94	29-57	0-37	80	89	72	17	99	64	35	91	4	7-50	11	4-00	-	6	3	1	2	4	4	3	7	1	-	-	-
August	-	29-79	-	29-94	29-48	0-46	80	88	72	16	94	61	33	91	5	12-40	15	5-30	-	5	3	1	3	3	5	3	7	1	-	-	-
September	-	29-79	-	29-95	29-57	0-38	80	88	71	17	99	65	34	91	5	8-10	13	4-15	-	3	2	0	3	4	6	4	8	0	-	-	-
October	-	29-80	-	29-99	29-62	0-37	80	88	71	17	92	64	28	92	5	11-25	17	3-74	-	3	2	1	3	2	5	4	11	0	-	-	-
November	-	29-80	-	30-01	29-65	0-36	80	88	72	16	99	62	37	90	5	8-07	16	3-30	-	5	3	2	2	1	1	4	12	0	-	-	-
December	-	29-80	-	29-95	29-67	0-28	80	88	72	16	92	65	28	89	5	6-77	14	3-33	-	12	5	1	1	2	2	1	7	0	-	-	-
Means	-	29-80	-	-	-	-	80	89	72	17	-	-	-	90	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87-40	145	-	-	78	49	10	29	31	40	34	91	3	-	-	-
Absolute Values	-	-	-	30-01	29-48	0-53	-	-	-	-	99	61	38	-	-	-	-	5-76	-	-	-	-	-	-	-	-	-	-	-	-	-
No. of Yrs. Obsns.	-	-	-	11-12	-	-	-	-	13	-	-	-	-	11-12	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	5	-

Authority :—Straits Settlements, Meteorological Returns.

Meteorological Office,
June 16th, 1915.

PLACE—SINGAPORE. OBS. Δ . LAT. $1^{\circ} 17' N$, LONG. $103^{\circ} 51' E$. Height above M.S.L., 10 feet.
METEOROLOGICAL TABLE COMPILED FROM 4 TO 22 YEARS' OBSERVATIONS. (1892-1913.)

MONTH.	BAROMETER At 32° F., Mean Sea Level, and Lat. 45°.				AIR TEMPERATURE.						Relative Humidity Scale 0 to 10.		RAIN.			WIND.								No. of Days Gale.	No. of Days Fog.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Mean.		Absolute.		Mean.		Absolute.		For Month.	Daily Range.	Max.	Min.	Range.	Max.	Min.	Range.	Total Fall.	No. of Days.	Max. Fall in 24 hours.	Mean Force, Beaufort Scale.	Number of Days from.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Ins.	Ins.	Ins.	Ins.	°	°	°	°													°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°

Authorities:—Memoirs of Indian Meteorological Department, Vol. 22.
Straits Settlements, Meteorological Returns.

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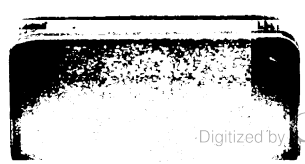
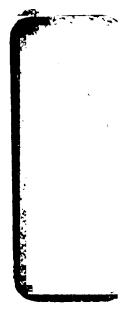
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